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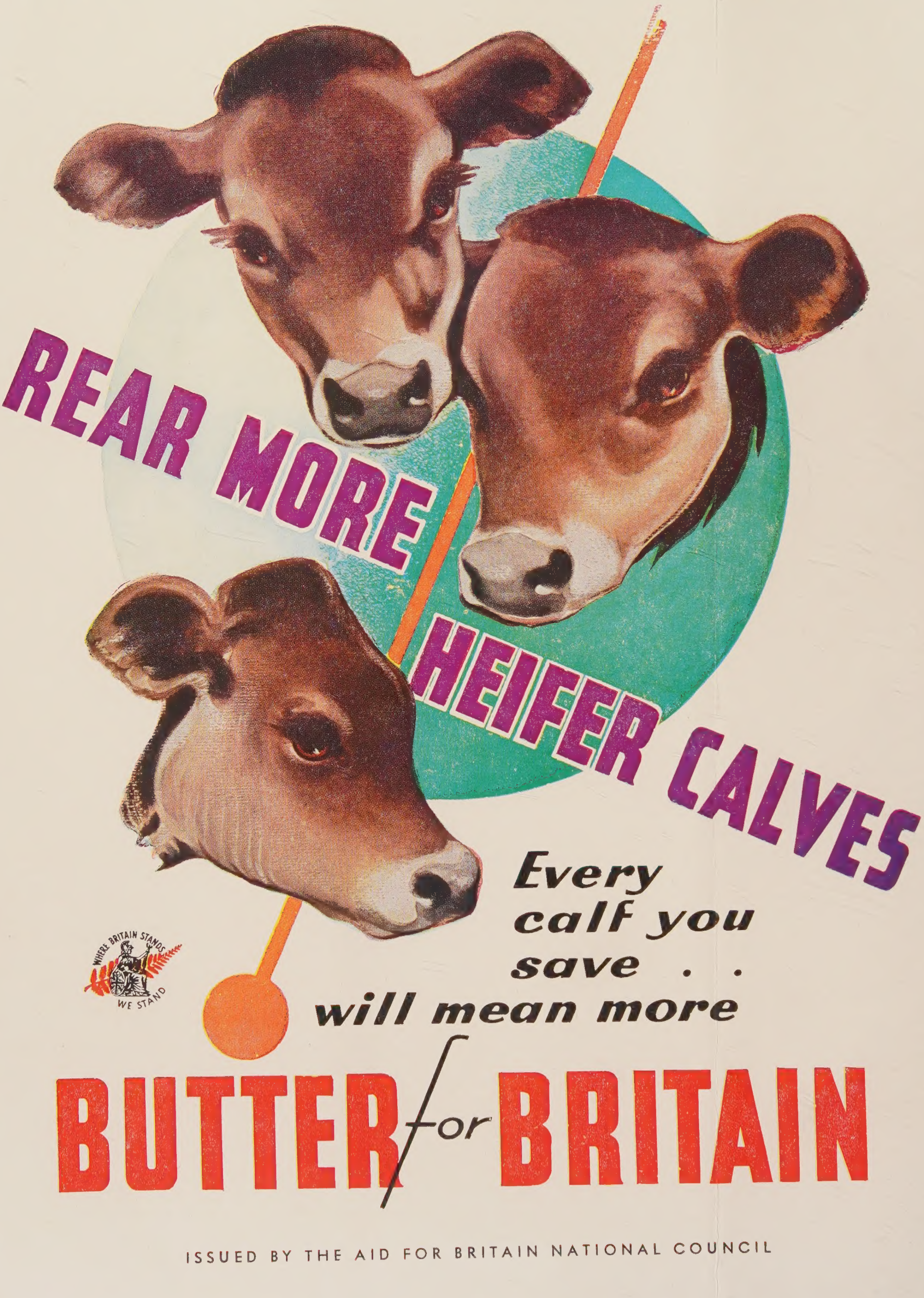
L.C. MITCHELL


REAR MORE
HEIFER CALVES
Every
calf you
save . .
will mean more
BUTTER for BRITAIN
WHERE BRITAIN STANDS
WE STAND

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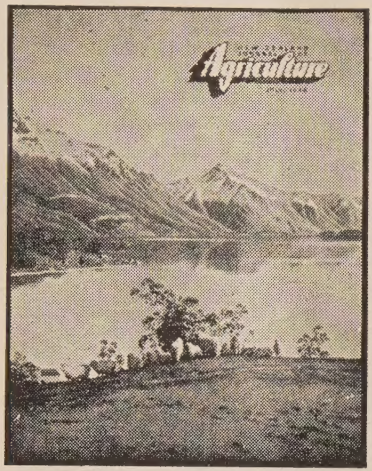

Some of the largest high-hill-country sheep runs in New Zealand are situated in the mountainous country of the South Island Lakes district, a scene from which, Lake Wakatipu, has been painted for this month's cover by L. C. Mitchell from a photograph by Geo. Chance, F.R.P.S., Dunedin. In this district, as in other high parts of the South Island, the Merino or Merino crossbred sheep has been found the most suitable breed to withstand the rigorous conditions and to thrive on the sparse herbage. The high-hill-country farms of the South Island produce nearly all the Dominion's fine wools, which were in demand overseas last season and realised high prices.

●

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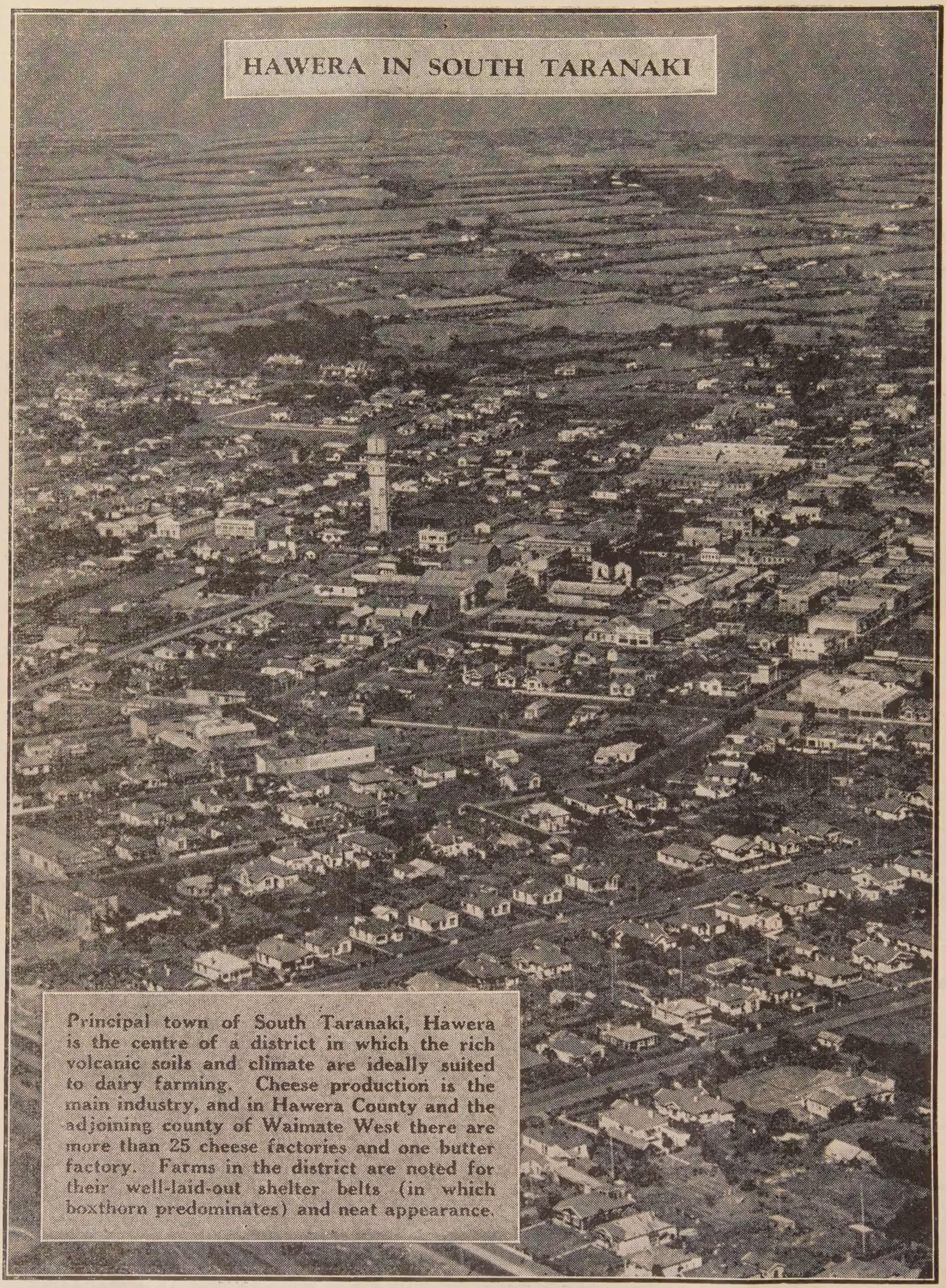
HAWERA IN SOUTH TARANAKI



Principal town of South Taranaki, Hawera is the centre of a district in which the rich volcanic soils and climate are ideally suited to dairy farming. Cheese production is the main industry, and in Hawera County and the adjoining county of Waimate West there are more than 25 cheese factories and one butter factory. Farms in the district are noted for their well-laid-out shelter belts (in which boxthorn predominates) and neat appearance.

[V. C. Browne photo.

OUTLOOK FOR WORLD FOOD SUPPLIES STILL GRAVE

INTERESTING but grim reading has been provided me by the report of the second meeting of the recently-formed Council of the United Nations Food and Agriculture Organization. This council of 18 member nations, the outcome of Sir John Boyd Orr's World Food Board proposals, was formed at the third session of conference of FAO, held at Geneva last September. The council, which meets several times a year, keeps in close touch with the world food situation and makes recommendations to Governments about the policy which it believes should be followed to relieve the present difficult situation and at the same time lay the foundations of a more prosperous era. The council may be likened to the board of directors of a company which meets regularly to keep in touch with the current situation as it affects the interests of the shareholders. To carry the analogy further, the annual conference of FAO resembles the annual meeting of the shareholders. However, "World Food Ltd." is passing through difficult times.

The Council of FAO held its second meeting at Washington from April 5 to 17 and, despite a small, short-term improvement because of prospects of a better harvest, the report of that meeting describes the world food situation as still grave. To quote from the report: "In most of the war-devastated countries pre-war levels of food production and consumption have not yet been regained; in fact, large areas of the world have been unable to maintain the inadequate consumption levels of a year ago. In many countries even the hoped-for increases in production would leave levels of nutrition at a point where morale, health, and working capacity of the people inevitably are impaired."

The report goes on to point out that there is nothing to indicate a total world food production even up to 1951 appreciably above the average for pre-war years, and that even if that level were reached, the world's population is increasing at the rate of 20 to 25 millions annually, so that consumption per head must decline. There is little doubt that the efforts at better distribution of available supplies through systematic rationing and the policy of full employment in many countries have added to the problem. For example, total milk consumption in Britain is 45 per cent. above the pre-war figure, but the ration for an adult is only 2 pints a week.

The report emphasises that in the past the gap between world demand and world supply was met largely by expanding the area under cultivation. Between 1910 and 1930 improved or cultivated land increased by 110 million acres in the four major agricultural exporting countries, the U.S.A., Canada, Argentina, and Australia. "No similar increase has occurred during and after World War II," states the report, which points out that though much undeveloped land remains in the world, it is situated in countries lacking the industrial resources and traditions to make large-scale, rapid development possible.

Further, some loss of good land has occurred in the well-developed countries through absence of soil-conservation practice resulting in erosion and depletion of fertility. In this connection the council draws particular attention to the significance of improved management of grasslands.

To quote again from the report: "Grass and other forms of herbage constitute the most important crop of vast areas in the world and there is enormous scope for rapid improvements both in increasing yields and in the adoption of well-known methods of conserving grass for winter use. The outlook for bread grains and feed crops indicates that world supplies of animal products will, in the future more than in the past, depend upon grass management." In view of New Zealand's specialisation in the technique of grassland farming I think that statement is of special significance.

The council makes numerous recommendations aiming at dealing with both the present emergency and the long-term problems of increasing production. To help meet the immediate problem it suggests improved methods of using available supplies by reducing waste in every possible way. In particular it emphasises the necessity of avoiding waste in stored foodstuffs and the use of by-products of primary industry such as skim-milk and edible fats.

To assist in the long-range problems it has set up a Policy Committee on Production and Distribution to assist Governments in the preparation of production programmes and to integrate these programmes into a world plan.

How can New Zealand help in the implementation of these aims? I think that in spite of the Dominion's relative smallness, both in area and in population, much valuable assistance can be given. By increasing to the utmost production of all types of foodstuffs, by bearing without complaint the very light burden imposed by the continuance of rationing, and by reducing wastage of foodstuffs to the minimum the people of this very favoured land can play their part in helping Britain and the less-fortunate nations of the world. By making available our valuable experience gained in certain branches of farming technique, particularly grassland farming, we can at little cost to ourselves help in no small way in the rehabilitation of some of those countries not so happily situated as New Zealand.

EDWARD CULLEN, Minister of Agriculture.

Pampas Grass in New Zealand

RESULTS OF A SURVEY OF FARMERS' PLANTATIONS

THE use of pampas grass *(Cortaderia selloana)* as a stock fodder appears to be confined mainly to New Zealand, though it has been tried to some extent in Tasmania (1). The plant is a native of the Argentine, but there is no record of its being used as a fodder in that country. After a number of years during which conflicting reports about the value of pampas grass have been received from farmers it now appears that, in some districts at least, plantations of the plant have been established successfully and are being used to advantage. This article by P. B. Lynch, Field Crop Experimentalist, and W. L. Osborn, Instructor in Agriculture, Wellington, presents the results of a survey of pampas grass plantations throughout New Zealand, which was made possible by the co-operation of a number of farmers who kept and made available records of their plantations.

THE survey was conducted during the latter part of 1947 and the beginning of 1948 by officers of the Fields Division. It was considered that the collation of farmers' experiences with pampas grass would give sound information about the place the plant now occupies in farming economy and possibly give some indication of its potentialities. The survey is based on results secured by farmers rather than on the Department's experiences. Concurrently with the survey, considerable experimental work is being carried out, but such work is necessarily a long-term project and results will not be available for some time.

Earlier Investigations

As early as 1877 (2) pampas grass was suggested as possibly having value as a supplementary fodder for cattle, but it was first used for this purpose in the early 1930's, since when considerable work has been done to investigate its merits.

Aston (3), who was then Chief Chemist of the Department of Agriculture, made some of the first scientific investigations of pampas grass. He quoted pampas grass of a dry matter content of 28.6 per cent. Shorland and Brooker (4) gave the following analyses for pampas grass, and they are compared with figures for green pasture, hay, and silage (5):—

	Dry matter	Percentage of material dried at 100 degrees C.			
		Ash	Protein (N x 6.25)	Lime (CaO)	Phosphorus (P_2O_5)
Pampas grass (after Shorland and Brooker):					
Sample No. 1	—	10.55	9.87	0.47	0.44
Sample No. 2					
Leaf portion	—	8.44	8.49	0.22	0.24
Basal portion	—	7.26	5.43	0.15	0.22
Pampas grass (after Aston)	28.6	8.16	8.71	—	0.36
Pasture grass, rotational	20.0	9.0	22.5	—	—
Poor meadow hay	85.7	5.8	8.7	—	—
Very good meadow hay	84.0	9.2	16.1	—	—
Grass silage	19.4	10.3	10.3	—	—
Lucerne silage	16.9	12.4	21.9	—	—

Grimmett (6) stated: "Pampas contains a large proportion of 'crude fibre,' and it is this, together with the small amounts of sugars, that make it chiefly a carbohydrate food. Shorland and Brooker give detailed analyses of the structural carbohydrates ('crude fibre') and state: ' . . . the chief difference between pampas grass and the common forage grasses lies in the higher percentage of cellulose (37 to 41 per cent., as compared with 21 to 33 per cent.).' "

Digestibility

Unfortunately the majority of this work has been very restricted, and only in more recent years has any really valuable contribution to knowledge of the grass been made. In New Zealand feeding trials have been carried out at the Animal Research Station, Ruakura, and the results obtained will be published when available. In preliminary digestibility trials (7) it was determined that the feeding value of the plant is greatly increased under high-fertility conditions and with grazing at 6-monthly intervals, whereas under low-fertility conditions and with 12 months' growth the feeding quality is very poor, with organic matter digestibilities in the region of only 40 per cent.

Therefore pampas grass under good conditions and management is a satisfactory maintenance ration equivalent to average- or medium-quality hay. In an earlier analysis of pampas grass Grimmett (6) had established that the fodder was comparatively low in phosphate, lime, and protein and high in dry matter and carbohydrate content, giving a useful supplementary feed for balancing protein-rich silage or pasture grass.

Overseas experience is very limited, but from Tasmania (1) come reports that pampas grass of New Zealand origin is more palatable than that of supposedly local origin and that under conditions there it has proved a valuable supplementary fodder plant for dairy stock. Numerous observational trials have been laid down throughout the North Island to increase knowledge of the successful establishment and use of pampas grass. On the whole manurial trials have revealed no obvious responses to applications of fertilisers, nor have any outstanding differences been shown between the various strains available to farmers, though it must be emphasised that these trials have been purely observational without the collection of yield data. Comprehensive trials have not been completed yet, but are in progress in Southern Hawke's Bay, at Flock House, Bulls, and at the Dargaville Demonstration Farm. At Bulls and Dargaville it is hoped that, as well as yield data, information will be available on the suitability of pampas grass as a substitute for hay for a winter milking herd (Flock House) and for wintering a dairy herd while dry (Dargaville Demonstration Farm).

Pampas grass is a dioecious plant—that is, the male and female flowers are borne on different plants. Therefore a plantation established from cuttings derived from a single plant frequently consists of all male or all female plants and seed production cannot take place. That is not the case with seedlings of mixed origin, but even in mixed plantations frequently little seed is produced and such seed is often of low germination.

Limitations of Survey

Two surveys were completed by field officers in the 34 districts throughout the country—a general summary to cover all plantations in a particular district and a comprehensive survey giving full details of each of a representative number of plantations of pampas grass.

In analysing the results of the survey the limitations of the method must be borne in mind. The two most serious are:—

1. The danger of presenting a too-favourable picture. Of necessity, the survey is based mainly on plantations that have been at least moderately successful. Plantations that have failed because of poor establishment or bad management in the main have been ploughed up and records of them are no longer available.

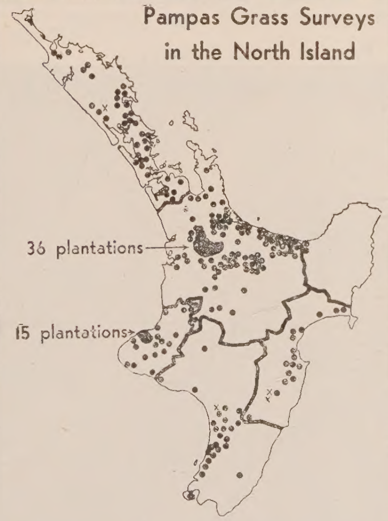
2. The difficulty of securing an equally-representative sample of plantations from each district. Some districts certainly have been much more thoroughly surveyed than others, and results from such districts exert a greater effect on the general summary than do results from districts from which relatively-scanty information has been secured.

PAMPAS GRASS SURVEY

A five-year-old pampas grass plantation in the Bulls district which was planted on a shallow, sandy soil over pure metal sand. Under these dry soil conditions growth has been unsatisfactory.

1934-37 Survey

Though it is intended to make additional investigations to check the latter point, the first limitation cannot be overcome readily. However, the following results from a survey conducted between 1934 and 1937 are of interest. This survey covered practically all plantings known to have been made at that time, an undertaking that could not be accomplished readily now because of the rapid increase in popularity of the plant.



Farmers' plantations covered by the 1934-37 and 1947-48 surveys are indicated by dots and Departmental trials by crosses.

District	Successes	Failures	Insufficient data
Auckland ..	52	55	25
Wellington ..	10	6	8
South Island	2	17	2
New Zealand totals ..	64	78	35

CAUSES OF FAILURES

Method of planting ..	33	(42%)
Unsuitable climate ..	18	(23%)
Inefficient management	18	(23%)
Unsuitable soil type ..	5	(6%)
Unknown	4	(5%)
Total	78	

1947-48 Survey

The general principles underlying the successful establishment of pampas grass are now much better appreciated and the earlier summary is unlikely to represent the present position. The following analysis covering the 139 plantations included in the 1947-48 survey should be compared with the earlier results:—

ANALYSIS OF FARMERS' OPINIONS

Enthusiastic	50	(36%)
Satisfied	34	(25%)
Disappointed	24	(17%)
Failure	11	(8%)
Non-committal	10	(7%)
Too early for a verdict	10	(7%)
Total	139	

CAUSES OF FAILURE OR DISAPPOINTMENT

Unsuitable soil	10	(29%)
Poor palatability	8	(23%)
Unsuitable site	7	(20%)
Utilisation and management	7	(20%)
Slow recovery	3	(8%)
Total	35	

PAMPAS GRASS SURVEY

A good two-year-old stand of pampas grass planted on alluvial clay loam at Flock House, Bulls. It had been deflowered just before the photograph was taken.

The proportions of failures or disappointments to totals from which sufficient data are available were: 1934-37, 78 out of 142, or 52 per cent.; 1947-48, 35 out of 129, or 27 per cent. Therefore a safe conclusion is that the proportion of unsatisfactory results from pampas grass during the past few years is not less than 27 per cent. or more than 50 per cent. It is also apparent that many failures could be avoided with greater knowledge of satisfactory soils and management.

Details of Plantations

The survey provided the following details of individual plantations:—

Number of farms surveyed: 139.

Number of plantations surveyed: 147.

Total area: 452 acres.

Average area: about 3 acres.

Number of plants included in the survey: 412,715.

Average number of plants an acre: about 900.

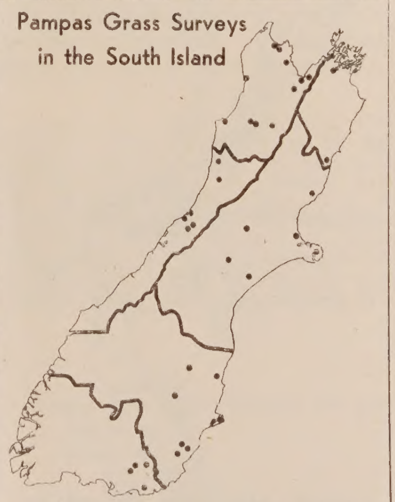
The comparatively-large average area of plantations (3 acres) is of interest, but the very small "odd-corner" type of plantation has not been included in the survey. Furthermore, it is likely that a greater proportion of the plantings of small areas have been omitted than of those of large areas, so that the average figure is probably on the high side.

The planting rate formerly recommended was at 6ft. centres, requiring about 1200 plants an acre. Distributors of the plants now recommend planting at 7ft. 6in. centres, requiring about 750 plants an acre. The average figure of 900 established by the survey probably includes plantations at all spacings between those limits.

Types of Farms Growing Pampas Grass

The numbers and percentages of the total of each class of farm growing pampas grass as given by the survey are: Dairy, 86, 62 per cent.; sheep, 13, 9 per cent.; mixed, 40, 29 per cent. The predominance of the dairy farm is probably a true record of the position, as until now pampas grass has been most popular with dairy farmers. Pampas grass is not provided for sheep and normally they will not touch it, so they can be used to control weed and grass growth in pampas grass plantations. On sheep and mixed farms pampas grass is grown for wintering run and store cattle or for feed for house cows.

The topography of farms was classified as: Flat, 75, 54 per cent.; hilly 32, 23 per cent.; undulating, 32, 23 per cent. This division largely reflects the predominance of dairy farms, which are confined mainly to flat or undulating country. Pampas grass will not grow satisfactorily in exposed positions, and steep hills are not favoured because of difficulties of cultivation and access. In hilly country pampas grass areas are usually located on small flats or parts of the farm of easier topography.



Farmers' plantations covered by the 1934-37 and 1947-48 surveys are indicated by dots.

Soil Types used for Pampas Grass

Plantations covered by the survey were growing in the following soils:—

	Condition of Plants in each Group		
	Very good or good	Fair or poor	Total
Rich alluvial soils and soils of high fertility	10	1	11
Drained swamps (not peats)	7	2	9
Silt loams ("medium" soils)	17	3	20
Heavy clays and clay loams	16	5	21
Sands and sandy loams	26	8	34
Peats and peaty loams	12	8	20
Pumice soils	8	—	8
Unstated and miscellaneous			16
	96	27	139

Plantations in poor condition were found on practically all classes of soil. The position is confused by the operation of factors such as unsuitable climate and bad management, and also by the bias mentioned previously in the selection of the more successful stands; for example, a considerable number of failures of pampas grass have occurred on pumice soils. In general, however, and when individual reports are considered the number of different classes of soil on which pampas grass has been established successfully and is giving reasonable growth is surprising. As might be expected, the peat soils—and especially the more "raw" peats—show up most unfavourably and the most fertile soils give the best stands and the most growth. Nevertheless quite a number of satisfactory pampas grass plantations have been established on peat soils.

Classes of soil that seem generally unsuitable for pampas grass are: Very low-fertility soils; hard-pan conditions which impede root growth; extremely-dry soils with a low water table (for example gravels and bare knolls); and completely waterlogged conditions.

Pampas grass responds well to good soil and treatment and, other things being equal, will give the best growth on the most fertile soils.

Climatic Requirements

Assessment of the climate required for the successful growth of pampas grass is difficult. Though healthy isolated plants may be found as far south as Invercargill, there is no information about the growth rate of such plants, nor can there be found in Otago-Southland plantations on reasonably-fertile soil which have been managed correctly and which produce reasonable quantities of fodder yearly. On the other hand, a number of failures of plantations in Canterbury and Otago-Southland have been attributed to unsuitable climate. In none of these cases can it be certain that the failure has been caused by climate and not by other factors, and the question can be settled only by careful experimentation. It appears probable, however, that the time taken to establish a plantation (before it is fit for grazing) and a slow growth rate in cold climates make pampas grass a doubtful farming proposition for most of the South Island with the exception of Nelson, Marlborough, Westland, and a few coastal districts in Canterbury.

Officers of the Fields Division were asked their opinion of the value of pampas grass in their districts and following is a summary of their replies:—

Considered a valuable plant: North Auckland, Auckland central, Waikato, King Country-Taumarunui, Hauraki Plains, Taranaki, South Taranaki, Wanganui, Horowhenua, Hawke's Bay (but not the dry parts of Central Hawke's Bay), and Westland.

Considered of minor value: Manawatu, Wairarapa, Rotorua, Gisborne, Central Hawke's Bay, Matamata, Whakatane, Nelson, and Marlborough.

Considered of doubtful value or of no importance: All Canterbury and Otago-Southland.

With a few exceptions, therefore, the warmer, higher-rainfall districts of the North Island are the areas where pampas grass is considered a useful plant, and such a climate appears best suited to the growth of pampas grass.

The exceptions are of interest. They are:—

1. The inclusion of Hawke's Bay and Westland in the first category. In Hawke's Bay the demand for a suitable feed for wintering store cattle makes any feed that pampas grass can produce especially valuable. In Westland the great difficulty of making hay in a climate of very high annual rainfall is a particular reason why pampas grass, if it can be grown reasonably efficiently, is a most important supplementary fodder for that district.

2. The inclusion of Matamata in the "minor-value" class. This highly-developed dairying district will grow pampas grass well, but the Instructor in Agriculture remarks: "Very few old-established stands have any value. These were mostly planted in unsuitable places. For some years no planting took place, but recently there has been a revival under better conditions and a survey in three years' time would yield considerable data. New stands are not old enough to judge their efficacy." In the Manawatu pampas grass plantations have been grown successfully, but the Instructor in Agriculture considers the plant is of minor value in comparison with hay and other supplementary crops.

Though pampas grass is not grown for fodder to an appreciable extent in the South Island, that it will grow well is exemplified by the fact that it is common on farm drives and as specimen plants in gardens as far south as Invercargill. The plant shown was grown at north Taieri.

Fertilisers for Pampas Grass

As the following figures show, very few farmers apply fertilisers to pampas grass:—

No fertilisers	115
Superphosphate	7
Blood and bone	5
Miscellaneous	5
Unstated	7
	139

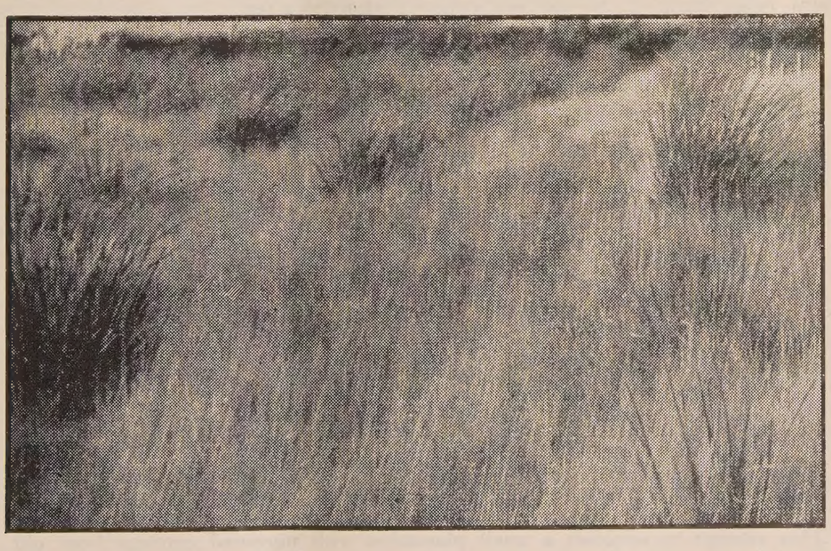
No accurate measurements of the effect of fertilisers on pampas grass on various soil types are available, and no responses from fertilisers have been observed. It is possible that a grass plant such as pampas would respond to nitrogenous dressings, or that it would benefit by association with plants of the clover family, which, by means of bacteria living on their roots, build up the nitrogen level of the soil. The answer can be assessed definitely only by detailed field experiments.

Palatability

Farmers' opinions of the palatability to cattle of their stands of pampas grass varied as follows:—

Very good	16
Good	74
Fair	22
Poor	10
Very poor	2
Unstated	15
	139

Thus, out of 124 who gave opinions, 90, or 73 per cent., of the farmers considered pampas grass a palatable fodder and only 12, or 8 per cent., ranked its palatability as poor or very poor. Considerable publicity has been given to the superior palatability of certain "strains" of pampas grass as distributed by vendors, but there is no definite evidence from this survey in support of those claims. In most plantations certain individual plants



Pampas grass can be palatable even to rabbits. The pruned appearance of these plants is caused by rabbits, which ate the pampas grass as fast as it grew.

PAMPAS GRASS SURVEY

A pampas grass plantation, grown from seedlings from Whangarei, 20 months after being transplanted and after the first feeding off. All plants have been grazed evenly, indicating little or no difference in palatability.

will receive attention before others, even though they grow from cuttings derived from the same plant, but generally all plants are grazed equally well at the conclusion of the grazing period.

Overseas Experience

On the other hand, Tasmanian experience (1) suggests that pampas grass grown from seed collected in New Zealand is more palatable than plants derived from pampas grass of unknown origin that had apparently been growing in Tasmania for a considerable period. In Argentina the plant is not usually regarded as palatable and letters received from that country, which is regarded as the original home of the plant, express surprise at its use for cattle fodder. However, there is a number of related species in Argentina and possibly one of these few palatable species was introduced into New Zealand.

The relative palatability of species is most difficult to decide. It is affected not only by variations in soil and climate, but also by unpredictable fancies of the animals concerned. The native toetoe (*Arundo conspicua*), a tough-leaved plant often mistaken for pampas grass, frequently will be sought by cattle and well chewed down, though it is normally classed as unpalatable.

Establishment and Cultivation

The survey showed clearly the need for adequate prior cultivation of an area intended for pampas grass. In other words, pampas grass must be treated as a crop, as indeed it is, and it will not compete successfully with rank growth, blackberry, gorse, and other inhabitants of waste land.

The average percentage of plants establishing (from 127 returns) as shown by the survey was 81. The percentage of plants surviving after various classes of cultivation was:—

	No. of cases	Percentage of plants surviving
Very good cultivation before planting, very little after planting	15	92
Reasonably good cultivation before and for several months after planting ..	59	86
Fair cultivation before planting, little or none after planting	34	77
Holes dug in pasture for plants, no subsequent cultivation	19	63
Total	127	Average 81

The first two classes show the merits of good cultivation for securing the best establishment of pampas grass. If prior cultivation is very good, in most cases the need for cultivation after planting is reduced.

The last class contained establishment rates from nil to 100 per cent. In the former cases the pampas was planted among scrub and fern, and under those conditions it will not survive. However, when the pampas grass was planted in reasonably well-controlled pasture, such as may be secured by using sheep, the percentage of plants establishing was surprisingly good.

Cuttings or Seedlings?

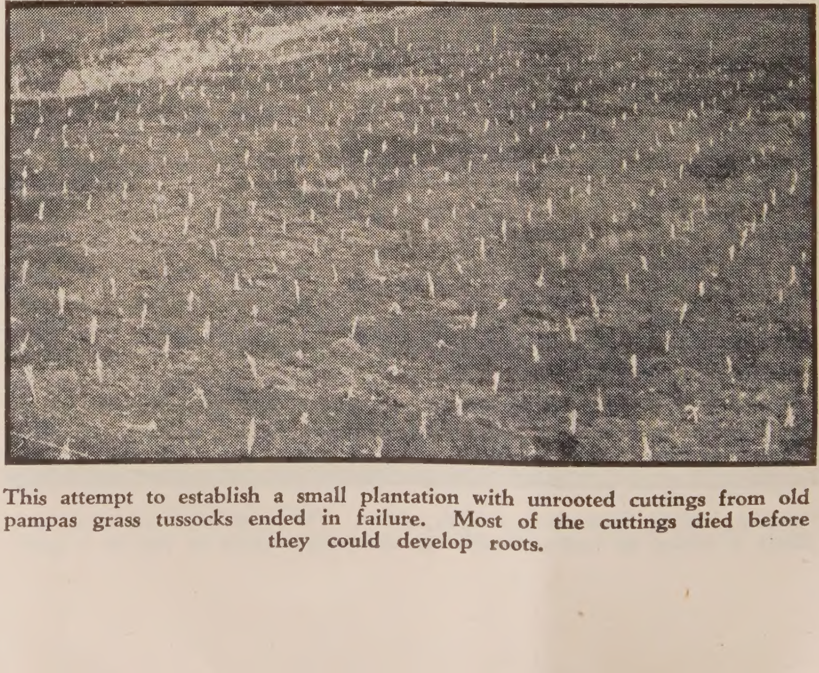
Two main classes of plant material are available to farmers—cuttings and seedlings. The majority of seedling plants distributed to farmers originate from an area of flat coastal country under the control of the Whangarei Harbour Board. Such seedlings have been self sown and are found growing between mature pampas plants which flourish in the rich soil of the Whangarei estuary.

A contentious point is whether cuttings have any advantages over seedlings in vigour of growth, evenness of growth, and palatability; that can be decided only by experiment and it is being investigated. Claims have been made for various "strains" of pampas grass, but the only verdict that can be given at the moment is "not proven."

A recent report from a trial at Flock House, Bulls, where seedlings and cuttings were planted, is typical. The report, which is dated May 20, 1948, states: "At present it is impossible to pick the differences and the dividing line between 'strains' without the use of the sketch plan, all 'strains' looking almost exactly the same."

The percentage of plants establishing from seedlings (80) was identical with that establishing from cuttings for plantations wholly derived from either source. Out of 119 such plantations 28 were planted with seedlings and 91 with cuttings.

Spring (August to October) planting is generally recommended, but autumn (March) planting has been successful in some districts, provided conditions are not too dry and severe frosts do not occur shortly after.



This attempt to establish a small plantation with unrooted cuttings from old pampas grass tussocks ended in failure. Most of the cuttings died before they could develop roots.

A three-year-old plantation of pampas grass which has given very valuable feed on a farm near Ngaruawahia.

More than 95 per cent. of plantations inspected were adequately fenced. It is well recognised that complete stock control is essential if pampas grass is to survive.

Deflowering

Generally regarded as necessary to improve both leaf production and palatability, deflowering seems to have little effect on the subsequent condition of plants, as the following figures show:—

CONDITION OF PLANTATIONS

	Very good or good	Fair or poor
Plants regularly deflowered	79 (83%)	16 (17%)
Plants not deflowered ..	24 (75%)	8 (25%)

Deflowering is usually done by hand in the first year after planting and in subsequent years by stock. The immature flower stalks are apparently very palatable and stock will remove them before grazing the leafage.

Grazing Management

Where cattle gained access to pampas grass within a few months of its being planted severe damage was invariably caused. The age of plants at the first grazing which can be obtained without damaging the plants varied from as low as nine months to four years, with the most common period two years. The rate of growth of the plant is the deciding factor. An analysis of the conditions of plants in plantations which had been grazed for the first time at all periods between the limits given showed no marked differences.

Grazing methods varied a great deal, but two things were regarded as necessary—a run-off pasture containing a reasonable amount of grazing and the feeding-off of the pampas in breaks to avoid undue wastage. In general, a break to last for 10 to 15 days was regarded as a satisfactory size.

The season of grazing depended on the use to which the plantation was put. Winter grazing was the more common, but summer grazing was adopted frequently in dairying districts. Well-established, vigorously-growing stands were occasionally grazed at six-monthly intervals, in both summer and winter; in that case the grazings would not be as severe as is usual with annual grazings.

In view of the findings at Ruakura about the improved feeding value of the plant when grazed at six-monthly intervals, it would seem that more attention could be paid to adopting a grazing system which would fit in with this requirement.

Grazing by sheep will keep the growth between plants in a pampas grass plantation under control.

Carrying Capacity

For 56 plantations for which grazing records were available the average carrying capacity was about 800 cow days an acre a year. This figure showed a range from 87 to 1960 cow days according to the soil and district, but most plantations approximated the average figure.

This figure, when considered with the average number of plants to the acre (900), fits in well with the formula "one cow one plant one day" which has been recommended as a basis from which to calculate the area of pampas grass required to winter a dairy herd.

Utilisation

The following list illustrates the diversity of the uses to which pampas grass is put in New Zealand:—

As a Maintenance Ration for Dairy Cattle

Most plantations have been planted for this purpose and there is no doubt that certain farmers are finding great benefit from such areas. Generally, pampas grass is used on dairy farms similarly to hay.

Of 29 farmers giving an opinion on this subject 11 considered pampas grass equal to hay, nine considered it inferior, and nine considered that their land would be more productive under pasture than carrying pampas grass. The opinion was generally expressed that the extended use of pampas grass is in part the result of the reduced labour demand when it is used to replace hay.

Despite this, however, the majority of farmers did not reduce the area of the farm devoted to hay, silage, or supplementary crops after establishing a pampas grass plantation. Of 113 farmers 48 (42 per cent.) had reduced their haymaking or cropping area. It

PAMPAS GRASS . . .

is considered that difficulty will be experienced in controlling pastures efficiently during flush periods of growth if the making of hay and silage is omitted, and this may have a bearing on the position.

Pampas grass is used in three main ways as a feed for dairy cows:—

1. During the winter maintenance period.
2. For winter milkers, in which case the provision of protein-rich supplementary feed such as a high-quality run-off pasture is essential.
3. As a reserve for drought periods. This factor has been mentioned frequently in recent years and farmers may well consider the provision of a small area of pampas grass beneficial, if only to meet this contingency.

For Wintering Run Cattle

Many Instructors in Agriculture rank this as the most important use of pampas grass. There is no question but that for more efficient control of pastures and soil erosion in North Island hill country a greater proportion of cattle to sheep is essential, but greater cattle numbers are frequently difficult to obtain because of the difficulty of wintering run cattle. If pampas grass is of value in this connection—and it is being used in this fashion by a number of farmers—the extension of plantations in hill country is warranted. The greatest difficulty is the obtaining of suitable soil and climatic conditions and suitable sites on the farms for pampas plantations on hill country.

For the Preservation of Pastures

This is of importance in districts where the soil pugs badly in wet weather, and in such circumstances a pampas grass plantation may be used to advantage to save the pastures.

[Department of Internal Affairs photo.

A five-year-old stand of pampas grass which has been fed off eight times, photographed five months after the last feeding off.

Where Haymaking and Crop Growing are Difficult

A case in point is Westland, where the extended use of pampas grass may be of very real benefit.

As Shelter

Pampas grass provides good low shelter for all classes of stock and many farmers interviewed in the course of the survey have commented on this fact.

More Research Needed

One of the outstanding results of the survey has been to show the need of critical research work into the growing and utilisation of pampas grass, and this work is being extended. There is no doubt that the plant is being grown and used successfully by a large number of farmers, but the proportion of failures is disturbingly high and farmers are by no means unanimous in their praise of the plant.

As with all agricultural plants, it has its uses and its limitations. Though pampas grass deserves serious consideration as a cattle fodder in the warmer, moister districts of the North Island, difficulties associated with the establishment and utilisation of the plant must be carefully considered. There is no evidence to show that it is anything more than a maintenance ration for cattle, and it must be used only as a supplementary food if the production or growth of stock is desired. The foodstuff it most closely resembles is hay and it should be fed under the same conditions.

The survey has outlined some of the factors associated with the growing and utilisation of pampas grass and the place it now occupies in farming economy. From the results it may reasonably be concluded that there are many circumstances in which an extension of the use of pampas grass is justified, and there is no reason to doubt that this will take place.

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METEOROLOGICAL RECORDS FOR JUNE

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Waipapakauri	6	52.6	−2.0	65.8	30.6	4.43	14	−0.87	1.09	19	
Auckland	160	52.4	−0.9	61.7	39.8	5.09	14	−0.33	1.46	19	126.0
Tauranga	10	49.6	−0.1	63.6	31.4	7.14	12	+1.80	2.52	20	140.3
Ruakura	131	46.4	−1.5	61.8	23.7	3.79	18	−1.02	0.61	20	118.5
Rotorua	980	46.3	+0.5	60.2	28.0	5.75	8	+0.44	1.93	24	118.5
Gisborne	12	49.5	+0.5	67.9	35.9	7.01	22	+3.00	1.46	5	116.9
New Plymouth ..	160	50.2	+0.2	59.8	35.0	4.50	15	−1.60	1.35	27	132.2
Taihape	2157	43.1	+0.3	58.3	30.4	2.97	15	−0.31	1.79	28	
Napier	5	48.2	−0.2	68.5	32.1	3.31	14	+0.27	1.20	5	114.9
Palmerston North ..	110	47.2	+0.5	63.2	31.5	2.53	16	−0.97	1.25	28	99.3
Waingawa	350	44.9	−0.7	66.3	26.0	2.81	16	−0.80	1.78	28	104.7
Wellington	415	47.2	−0.7	60.8	35.0	3.05	15	−1.28	0.89	28	92.6
Nelson	24	46.4	+0.2	61.3	32.5	4.08	8	+0.59	1.74	24	149.6
Waterlea	12	44.4	−1.1	62.6	28.6	0.88	9	−1.53	0.52	27	150.6
Hokitika	12	45.2	+0.6	58.3	29.6	8.55	13	−0.60	2.80	20	131.0
Hanmer Springs ..	1225	38.3	−1.5	62.0	20.2	1.99	12	−1.46	0.44	25	80.2
Christchurch ..	22	42.6	−0.6	61.0	26.8	0.73	12	−1.81	0.21	6	106.2
Ashburton	323	41.5	+0.1	66.0	26.2	1.32	16	−1.15	0.28	13	97.2
Timaru	56	42.8	+0.4	63.0	27.6	0.63	8	−1.16	0.32	13	126.8
Alexandra	520	36.8	−1.0	52.0	22.3	0.56	7	−0.20	0.15	24	98.9
Taieri	80	40.8	−1.0	56.6	23.0	1.97	13	−0.27	0.46	25	
Invercargill ..	32	41.0	−1.2	54.0	23.0	4.12	21	+0.37	0.62	29	75.7

PENICILLIN FOR TREATMENT OF MASTITIS

Preparations Suitable for use by Farmers

By R. W. ROACH,
Veterinary Research Officer,
Ruakura Animal Research Station.

EVER since the value of penicillin as a means of treating mastitis was first announced farmers in New Zealand have been eagerly awaiting some information about the availability of the drug in the Dominion. The news that two preparations devised overseas have been extensively tested in New Zealand during the past milking season and were found to be particularly satisfactory and admirably suited for use by the farmer will therefore be welcomed.

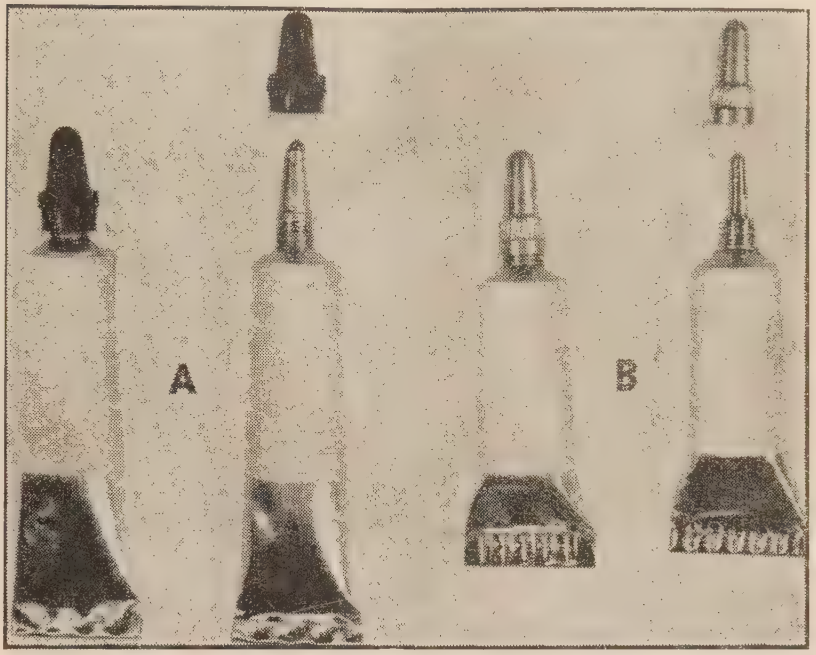


Fig. 1—Penicillin cream is now being made up in tubes ready for injection into the quarter. The nozzle is used as a teat siphon and is protected by a cap until required. A marks the emergency pack and B the standard pattern likely to be adopted.

IT has not been possible to make such an announcement earlier for several reasons. Quite apart from the question of supply, it has been necessary to evolve a suitable preparation that can be administered easily by the farmer. Penicillin itself appears as a fine powder so potent that a pinch is sufficient for a dose. Injecting a solution of this powder into the veins or under the skin is of no value, because the penicillin does not find its way to the milk. It is necessary to pass solutions or suspensions of penicillin directly into the quarter through the teat opening. The preparing of accurate doses from bottles of the powder is a slow task and, if carried out in the milking shed, contamination of solutions could easily occur. There is little point in the farmer being supplied with ready-prepared solutions of penicillin, because these are so unstable that within a month a pint of penicillin solution would be nothing more than a pint of brackish water.

The first of the new preparations which have overcome this problem is in the form of small sticks of water-soluble wax looking exactly like wax matchsticks in which the penicillin is mixed. To keep them from losing potency at ordinary temperatures they are packed in foil envelopes. The stick is passed into the teat canal, where it is dissolved in the milk. It had been hoped to have a large number of these available by this spring, but there have been difficulties in manufacture and it seems unlikely that they will be in general use by New Zealand farmers in the coming season.

In the second preparation the penicillin has been incorporated in a cream packed in small tubes, one dose to a tube. The nozzle of the tube is used as a teat siphon for direct injection of the contents into the udder. Though there has been a little delay in obtaining supplies of suitable tubes, quantities are already available in emergency packs and by the time this article appears the final pattern should be on sale. Fig. 1 shows (A) the emergency pack and (B) the standard design. It will be noticed that the nozzle in B is much better adapted as a teat siphon.

Cases to Treat

Nearly 90 per cent. of mastitis cases in New Zealand are caused by germs, not all of which are attacked by penicillin. It is fortunate that among those microbes that are attacked is the group referred to as streptococci, which are responsible for nearly 80 per cent. of the mastitis that occurs in the Dominion. It is evident, then, that rather than learn to distinguish between the various types of mastitis, it would be better to treat every case that occurs. Farmers will have had cases in their herds of hard quarters that become normal after a day or so without any treatment, and they may consider that it is better to wait a little while before commencing treatment. Such a procedure is to be condemned. It is quite impossible to forecast what the course of the disease will be, and it is far better to treat cows as soon as symptoms appear.

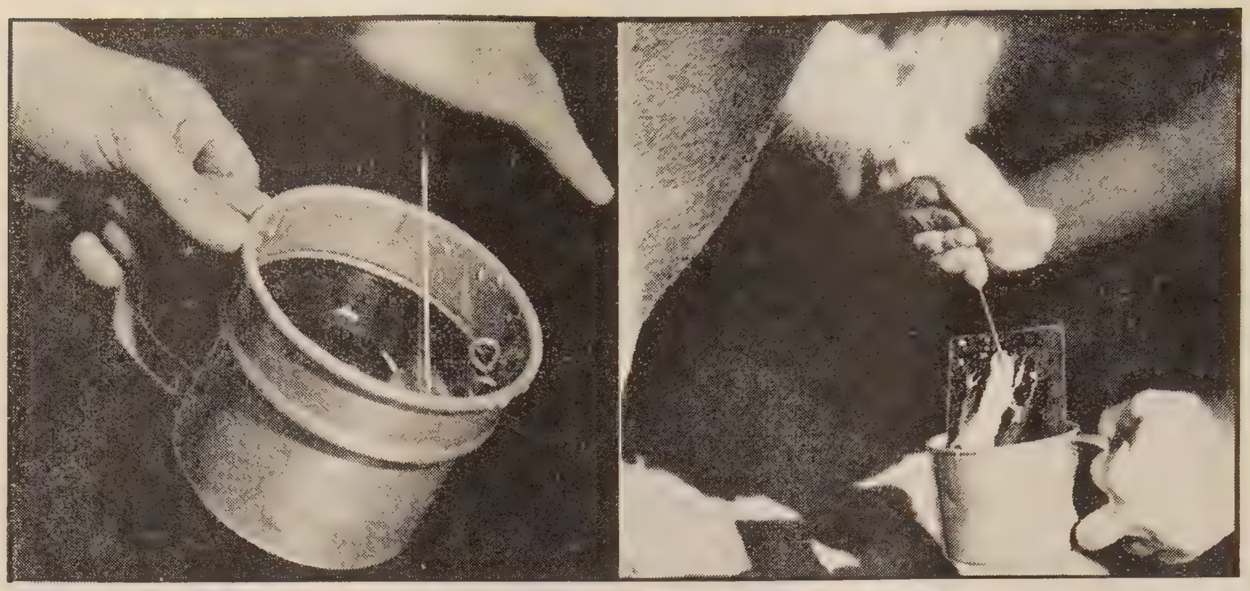
Work done on farms in the vicinity of the Animal Research Station at Ruakura has shown conclusively that cases treated as soon as they are recognised respond very well and the quarter gives a full quota of milk. If treatment is delayed until the case is really bad, it is found that there is less response to penicillin and, moreover, some 53 per cent. of such cases result in a light quarter which gives only a fraction of the potential yield.

How to Recognise Cases

The usual symptoms of mastitis are familiar to farmers. The quarter becomes firm and frequently swollen; there is little pain but usually a little uneasiness; the cow may be dull for a day or so. The milk may take on a variety of appearances, depending upon the severity of the infection and the time it has been active before recognition. Thin milk with tiny granules; ordinary-looking milk with white curds or clots; thin, brown milk; thick, yellow, custard-like milk, or white, porridgy, clotted milk are some of the manifestations of infection.

Farmers may not realise, however, that long before such symptoms have developed changes have been going on in the udder, sometimes for months. If steps are taken to identify cases at the earliest stage, far better results will be obtained. The earliest recognisable sign is the presence of a few flakes or clots in the first few draws of milk. Unless these are looked for particularly, they will be missed. If it is the practice to put on the teat cups without starting the cows by taking a draw of milk first, it is certain that early cases of mastitis will be missed. If the milk strainer under the releaser is examined a number of curds will probably be found.

To be sure of recognising cases early the fore milk of each cow at every milking should be examined with a strip cup as shown in Fig. 2, when the



To get the best results from penicillin cows must be treated immediately cases are recognised. To assist in early recognition the fore milk at every milking should be examined with the use of a strip cup (Fig. 2, left). Fig. 2A (right) shows a substitute strip cup made from a piece of tin painted a mat finish black placed aslant in an aluminium mug.

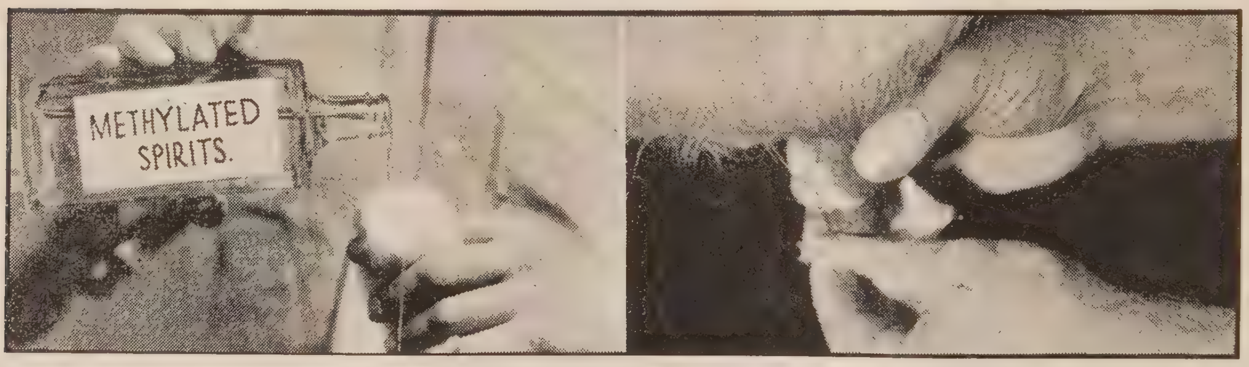


Fig. 3 (left)—Cottonwool soaked in methylated spirits and looped over the forefinger is used for cleaning the teat end. Fig. 4 (right)—Teats must be thoroughly cleaned before treatment begins.

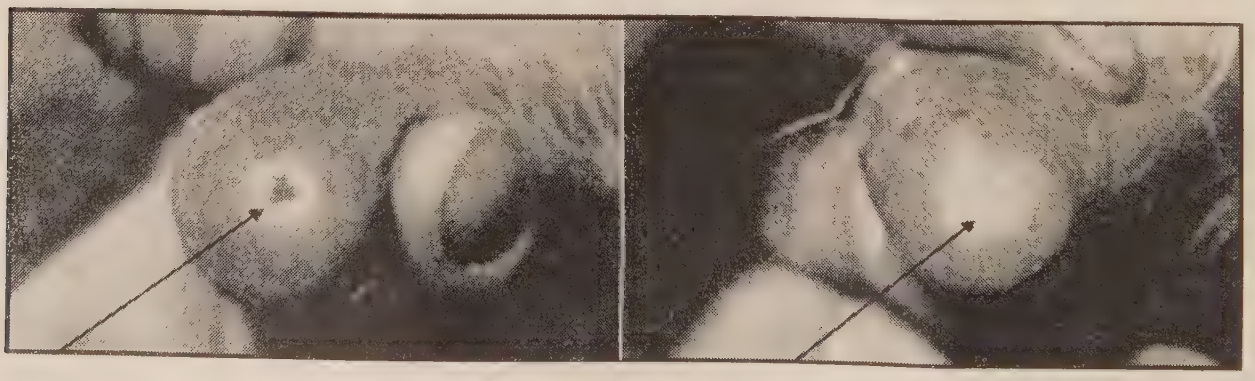


Fig. 5 (left)—This teat end appeared clean, but the teat opening was still dirty and many harmful germs would have been carried into the quarter if treatment had proceeded. Fig. 6 (right)—Treatment should not be started until the teat is as clean as this one.

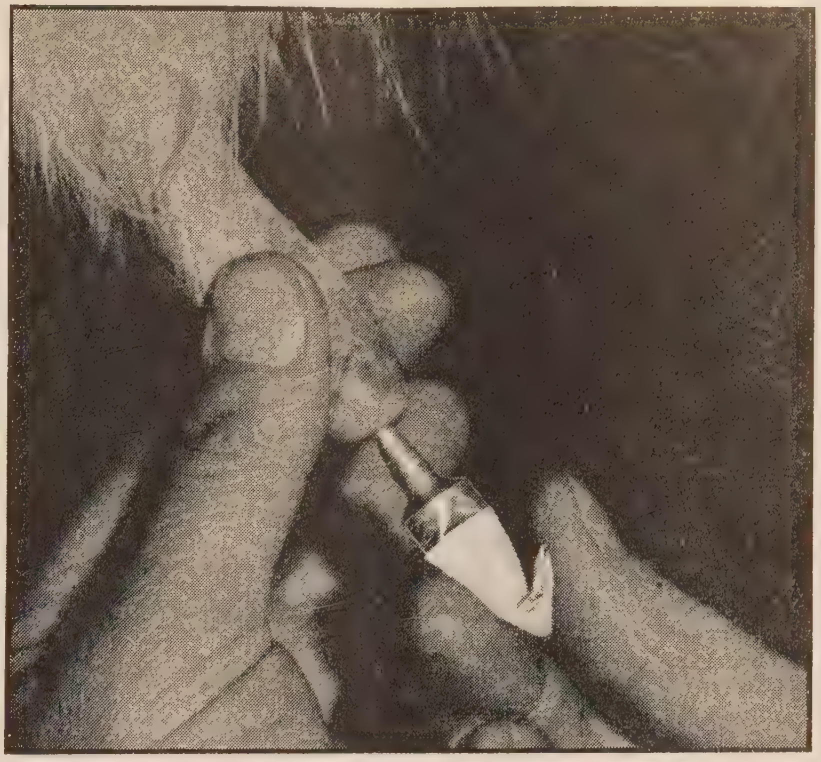


Fig. 7—Injecting the quarter. The nozzle is gently inserted into the teat opening and the contents of the tube squeezed in, the tube being doubled over as it empties.

white clots can be seen against the black background. This may increase the total milking time by five minutes or so, but it will pay good dividends. Strip cups are not at present easy to acquire, but it should be possible to make a suitable substitute after examination of the photographs at the top of the opposite page. A sheet of tin painted black and placed on a slant in an aluminium or enamel mug (Fig. 2A) is quite satisfactory.

Method of Treatment

Cows should be treated after they have been milked, a tube being injected on each of three successive days. The cows should be milked out at the usual times between treatments. This will waste a certain amount of penicillin, which has been allowed for in assessing the dose. If the cows are not milked out between injections, a substantial setback in milk yield will result. If the milk has not returned to normal 24 hours after the last dose has been injected, the advice of a veterinary surgeon should be sought.

The most practical method of carrying out treatment is to turn back into the yard after milking those cows which require treatment. These can then be treated after all the cows have been milked, when there will be no need to rush as would be the case if they were treated during milking.

Before commencing treatment the hands should be washed thoroughly and the affected quarter milked out. The teat ends must be cleaned up thoroughly, even though the teats were washed before milking. If all muck is not cleaned from the teat opening, the microbe *Bacillus coli*, one of the most common germs associated with cow dung, will be carried into the udder, and as it is not attacked by penicillin, it will infect the weakened quarter. The bottom 1½in. of the teat should be wiped with cottonwool soaked in methylated spirits (Fig. 4), some of the cottonwool being looped over the finger to ensure that the finger does not touch the teat end (Fig. 3). Special attention should be paid to the teat opening, because pieces of dung can easily lodge there (Fig. 5). The teat must be cleared of every speck of dirt (Fig. 6). If teats are very dirty, it may be necessary to wash them with soap and warm water before finishing off with methylated spirits, but in this case care must be taken that the teat is thoroughly dried, otherwise bacteria will be carried down to the teat opening. For this reason the use of disinfectants other than spirit is to be avoided; moreover, some disinfectants destroy penicillin.

The Treatment

After the cow has been milked and the hands and teat have been cleaned the cap of the nozzle should be unscrewed, holding the bottom of the tube between finger and thumb of one hand. The nozzle should not be touched. A squirt of milk should then be drawn with the other hand from the quarter to reveal the exact location of the teat opening. With the teat held gently, the nozzle of the tube should next be inserted as far as it will go comfortably. With the emergency pack this will be only about ¼in., but with the narrower pattern the whole length of the nozzle can be inserted without trouble. Force should not be used at any time during the procedure; if force is required something is wrong. The contents of the tube may now be squeezed into the teat. Some overseas patterns which may be available are sufficiently small for the contents to be emptied in one squeeze, but with the New Zealand pattern it will be necesasry to squeeze about ½in. of the tube, starting from the bottom, fold over the empty part, and proceed until all the contents are injected (Fig. 7).

How to Store

Penicillin gradually loses potency unless stored in a refrigerator. Though the preparation already described is fairly stable, it is advisable not to obtain more tubes than can reasonably be expected to be needed in two months and to keep them in the coolest and cleanest part of the shed. Curious friends and neighbours should not be allowed to unscrew the cap, which should be kept firmly in place until just before use. All tubes must be used before the expiry date, which will be stamped on them.

Efficiency of Treatment

Though not all cases are suitable for penicillin treatment, and other cases may not require treatment, it was found that four out of every five of all cases reported from a group of farms around Ruakura gave usable milk at the end of the course of treatment.

The Supply Position

During the early part of the spring of 1948 supplies will be barely sufficient and farmers are asked not to purchase more than their bare requirements. It is hoped that after that supply will keep pace with demand. Penicillin preparations for the treatment of mastitis will be obtainable from veterinary surgeons and from pharmaceutical chemists.

Suppliers of Cheese Factories

Penicillin does not appear to affect the grading of cream, but suppliers of cheese factories should remember that as cheese starter is readily attacked by penicillin, if milk from a number of cows under treatment is allowed to enter the cans, the starter may be destroyed. To safeguard against this milk from cows under treatment should not be sent to cheese factories until 24 hours after the last injection of penicillin.

Veterinary Demonstrations

An attempt has been made in this article to show how best to use penicillin in the treatment of mastitis, but as it is obviously impossible to anticipate all questions dairy farmers may wish to ask, veterinary demonstrations are being arranged in as many centres as possible. Every dairy farmer should endeavour to attend at least one of these before he attempts to treat his own cows, and if no veterinary demonstration has been held in his district by the end of July, he should write to the Livestock Superintendent, Department of Agriculture, in Auckland, Palmerston North, Christchurch, or Dunedin.

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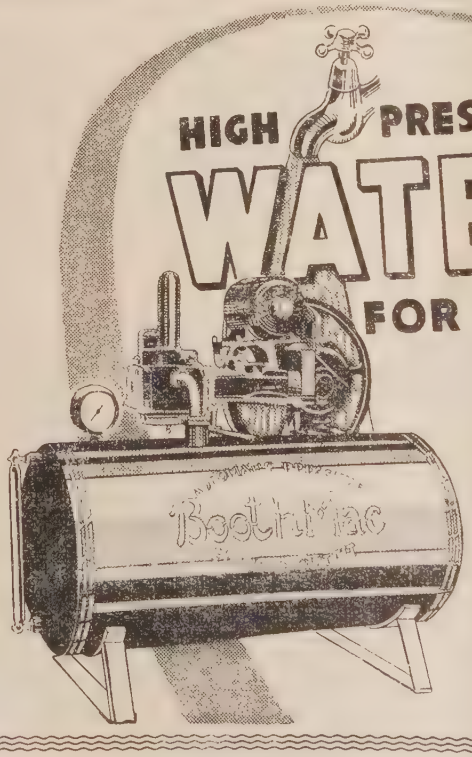

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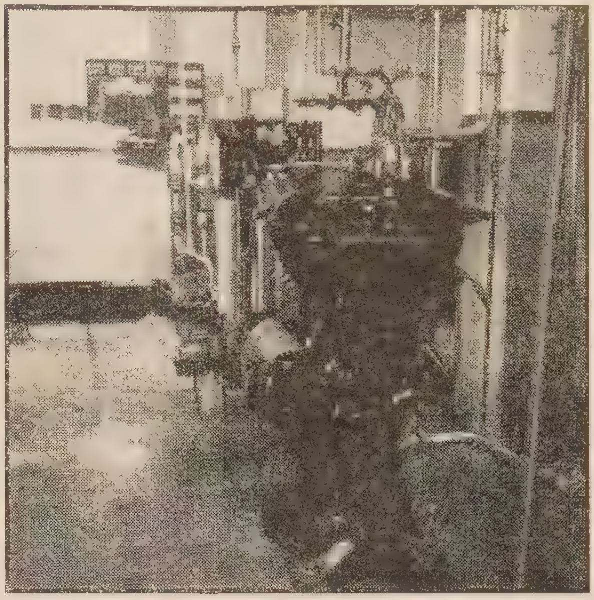
ALFA CONTINUOUS BUTTERMAKING

Progress Report on Equipment Installed at Waharoa

EQUIPMENT for the Alfa continuous buttermaking process which was purchased by the New Zealand Government and made available to the dairy industry for trial arrived in New Zealand during September, 1947, and was installed at the New Zealand Co-operative Dairy Company's factory at Waharoa. A report on the progress of the investigations into the process during the present season by Dr. F. H. McDowall, deputy-chairman of the technical sub-committee supervising the investigations and chief chemist of the Dairy Research Institute (N.Z.), and G. M. McWhirter, Butter Instructor, Dairy Division, Department of Agriculture, who was appointed manager of the trials, follows, with an introduction by H. A. Foy, Director of the Dairy Division and chairman of the committee appointed to control the trials.


The concentrator in the foreground with the dosing outfit and transmutator in the background.

PREPARATIONS for the commencement of the investigations at Waharoa were well in hand before the equipment arrived, and it was installed and ready for operation by the beginning of November. In the meantime some experience with the cream concentrator section of the process had been gained during a month's trial at the Dairy Research Institute. In the early stages assistance was given by a representative of the Alfa-Laval Separator Company who had been sent from Sweden for the purpose. Full-scale investigation of the process has been in progress since the beginning of November and is still proceeding.

Waharoa was selected for the trial because suitable space was available at the butter factory and both farm-separated and factory-separated cream could be supplied. The location has proved to be entirely suitable. The investigation has proceeded smoothly and without causing serious inconvenience to the main operations of the butter factory. The committee controlling the trial is indebted to the directors of the New Zealand Co-operative Dairy Company for making the facilities of their factory available for the investigation and to the manager and staff of the factory at Waharoa for their ready assistance.

The Alfa Process

The equipment for the Alfa continuous buttermaking process consists of three main units, the cream concentrator, the mixing vat, and the transmutator. The cream concentrator is a special type of cream separator for re-separation of ordinary cream to a **heavy cream** containing over 80 per cent. of fat. Moisture content of the heavy cream may be controlled or varied while the concentrator is running by an adjustable spring-loaded valve over the cream outlet, which can effect alteration of the back pressure on the cream in the concentrator bowl. Uniformity in moisture content of the heavy cream is dependent on uniformity of fat test and of temperature of cream delivered to the concentrator.

The mixing vat is a small tank with an efficient agitator and with means for adding dry salt and solutions of butter aroma and butter colouring if these are necessary.

The transmutator consists of three brine-jacketed cylinders provided with closely-fitting internal rotors which scrape the surface of the cylinder wall. The butter mix is passed in succession through the three cylinders, where it is cooled by brine circulated through the jackets, and at the same time it is carried forward by the ribs on the revolving rotors. The butter mix is cooled in the transmutator from 130 degrees F. to between 50 and 55 degrees F., and is converted to butter during its passage through the machine. It is discharged from the outlet pipe as a semi-liquid butter which hardens rapidly.

The investigation has been focused on a number of factors of critical importance to the operation of the plant as a commercial factory unit, which include:—

1. Running of the concentrator to give the desired moisture content of the heavy cream.
2. Extent of sludge deposition in the concentrator bowl.
3. Fat losses in the skim-milk.
4. Operation of the mixing vat for control of salt content in the butter.
5. Running of the transmutator to obtain best-quality butter.
6. Methods of packing the semi-liquid butter.
7. Quality of the butter fresh and after storage.

During the investigations it has been found necessary to modify the procedure recommended by the originators of the process to suit conditions in New Zealand, and a number of improvements have been introduced.

Moisture Control

It has not yet been found possible to obtain consistently-satisfactory control of the moisture content of the butter. In normal churning it is customary to obtain an average moisture content of about 15.7 per cent.—within 0.3 of the legal maximum, which is 16.0 per cent. Apart from the effects of variations in fat content and temperature of the pasteurised cream, there have been the following difficulties:—

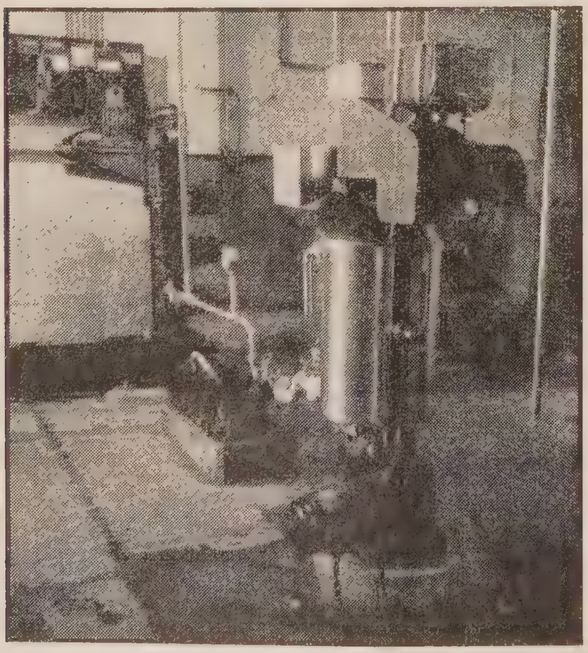
(a) For no apparent reason the moisture content of the heavy cream for any one cream-outlet pressure varies considerably from day to day. This means that the separator adjustment must be varied every day to suit the cream being handled.

(b) After the commencement of a run the moisture content of the heavy cream may drift either upward or downward and therefore constant moisture testing of the heavy cream is necessary.

(c) The system recommended by the manufacturers of the plant—to depend on moisture testing of the butter as a guide to the control of moisture content of the heavy cream—introduces a lag equivalent to seven boxes of butter before the effect of an adjustment to the control screw shows up in the butter composition. This involves the danger of making at least seven boxes of over-moist butter at the commencement of each day's run. It has therefore been found essential to rely on tests of the moisture content of heavy cream rather than on butter analysis, and a satisfactory method of moisture testing on the heavy cream has been introduced. The ordinary butter moisture test, involving weighing of exactly 10 grammes, cannot be used because of the moisture loss from the cream at 130 degrees F. during the weighing out. Satisfactory results have been obtained by taking a sample of approximately the correct weight direct into a lidded moisture basin and completing the moisture test without adjusting the weight to 10 grammes. This has assisted in approaching a satisfactory moisture control, but when the moisture content of the heavy cream shows a drift during the run constant analysis of the heavy cream is necessary to keep pace with the changes.

(d) When the setting of the control screw is altered there is a lag of several minutes before the moisture content of the heavy cream becomes adjusted to the new setting, and sometimes there is no response to the change in setting. In an attempt to overcome this difficulty a system of standardising the heavy cream in the mixing vat by adding skim-milk by means of the colour and aroma addition pumps has been introduced. This makes possible accurate moisture control, provided the concentrator is yielding a heavy cream of reasonably-uniform moisture content. The system of continuous standardising is considered preferable to relying on the control screw as the sole means of moisture content adjustment, especially as high back pressure on the cream in the concentrator reduces the capacity and therefore the butter output.

(e) On several occasions it has been found impossible to reduce the moisture content to below the legal maximum of 16.0 per cent. Under these circumstances a butter complying with the legal requirements could not be made and it was necessary to return the cream to the New Zealand Co-operative Dairy Company for churning by the conventional method. There is no provision in the Alfa process for handling over-moist butter other than by melting it down and returning it to the neutralising vats for repasteurising.



The dosing outfit, through which "heavy cream" passes. This unit is used for adding salt and also in connection with moisture control of the finished product.

Sludge Deposition

Though the Alfa-Laval Separator Company had intimated that the process was designed for use with freshly-separated cream, it has been found that the concentrator operates equally well on sweet farm-separated cream, but when the farm-separated cream contains a proportion of acid or of sweet-curdled cream the concentrator bowl rapidly becomes filled with sludge. This has occurred even when the bulk cream before neutralising had an acidity as low as 0.14 per cent.

The indications are therefore that the process in its present form would not be applicable for some types of farm-separated cream supplies. As acid cream is received at most New Zealand factories during some part of the year, it would not be safe to rely on the process as a sole means of buttermaking until some form of self-desludging separator has been incorporated into the system.

Fat Losses

The finding in Sweden that the fat content of the skim-milk from the Alfa concentrator is of the order of 0.1 per cent. has not applied with the creams handled in the present trial. Skim-milks containing 0.1 or 0.2 per cent. fat were obtained at the Dairy Research Institute when the concentrator was run on flash-pasteurised cream. Flash-pasteurised cream at Waharoa gave skim-milk of 0.5 to 0.6 per cent. fat test.

Vacreator-treated cream has given skim-milk containing 0.5 per cent. to 1.2 per cent. fat, but most frequently the skim-milk has been found to contain 0.7 per cent. to 0.8 per cent. fat. A fat content of 0.8 per cent. in skim-milk from 40 per cent. cream and giving heavy cream of 83 per cent. fat is equivalent to an overall fat loss of 1.04 per cent. of the fat in the cream used. In four direct comparisons in the making of butter from portions of the same batch of cream by the Alfa process and the conventional churning process it was found that the fat loss in the Alfa process was lower on the average by 0.3 per cent. of the total amount of fat in the cream.

Salt Content Control

The mixing vat provides a very convenient means of adjusting the salt content of the butter. The salt-addition device has been found to operate very satisfactorily, provided the salt can be kept dry and free flowing. Any degree of dampness in the salt causes irregular salt addition. Difficulties have been experienced with control of the salt content in the butter due to this factor.

Operation of Transmutator

The transmutator has been found to be well constructed mechanically and to operate satisfactorily, except that under conditions of high pressure leaks have occurred past the rubber sealing rings and gaskets. Adjustment of the degree of cooling applied to the butter mix involves a balancing up of a number of interdependent factors such as temperature of brine, rate of brine flow, rate of flow of butter mix, pressure at transmutator outlet, and setting of the by-pass on the heavy cream pump. However, with experience and a reasonably-uniform brine temperature the necessary control can be obtained without difficulty.

It has been found advisable to discard for melting and repasteurising the equivalent of one box of butter at commencement either with an empty or with a full transmutator, though instructions were to the effect that the transmutator could be left full overnight. It has been found during the trials that the first box of butter from a transmutator allowed to stand full overnight is of poor quality because of both unevenness in colour and inferior flavour. This applies also if for any reason such as a power failure the transmutator is stopped for more than about a minute.

The maximum throughput obtainable has been found to be about 20 boxes an hour, but the concentrator will supply cream at the rate of only about 12 boxes an hour.

The temperature to which the butter mix is cooled has an influence on the physical characteristics of the butter produced. Reducing the mix to too low a temperature gives a butter which will not pack readily, and this butter also may not be properly converted. If the temperature at the outlet is too high, the butter is too soft for satisfactory finishing and the closing of the box must be delayed. Butter taken off at the high temperature also may contain unconverted masses of cream. The most suitable temperatures have been found to be about 52 degrees F. at the outlets of both the second and third cylinders. Butter discharged at this temperature is soft enough to settle reasonably well in the box, yet hardens sufficiently rapidly to permit dressing of the butter surface and closing of the box immediately.

Packing

The machine as received delivered the butter to the box in a thin stream through a fish-tail outlet, and as it was not possible to halt the stream of butter while the full box was being replaced by an empty one, spillage of butter and soiling of the box were difficult to avoid. This disadvantage, however, can be obviated by the use of a three-way cock.

The vibrator, which agitates and settles the butter in the box, was originally a single-table model, but a twin-table unit of a different type has been introduced and co-ordinated with the three-way butter-delivery cock. This has greatly improved the packing procedure, but even with these improvements manual distribution of the stream of butter around the box is necessary if a closely-packed block of butter is desired. If the butter is taken off at a low temperature, it is difficult to obtain a closely-packed block by any practicable method.

The system of filling the butter into the box in semi-liquid form has certain disadvantages over the normal New Zealand system of applying the parchment paper to the already-formed and weighed block of butter.

It necessitates:—

(a) Dressing of the box with parchment before filling.

(b) Taring of the box plus parchment to allow for differences in the weights of empty boxes.

(c) Removal of a portion of the butter from the top of the filled container to adjust the weight. This removed portion, if added to the box being filled, does not become a closely-knit part of the block of butter to which it is added.

(d) The dry parchment does not fit closely to the inside of the box, and the semi-liquid butter frequently flows behind the folds. When the butter is turned out of the box it is often difficult to remove the embedded portion of the parchment wrapper, and when this wrapper is successfully removed it carries too much butter with it.

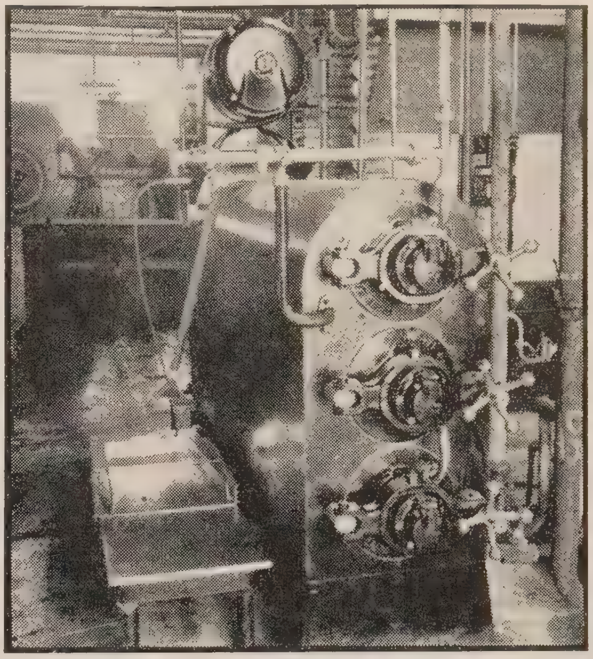
On the whole, though some improvements have been made, it is not considered that the packing has been developed to a stage suitable for general adoption in factories. Several attempts have been made to mould the butter in a New Zealand type bulk-butter packer, but is has been found that Alfa butter cannot be satisfactorily handled in this way.

Yield of Butter

The yield of Alfa butter is greater than that of normally-churned and washed butter because of the slightly lower rate of fat loss and the higher curd content. If the moisture content of the Alfa butter could be maintained at an average of 15.7 per cent., the curd content would be about 1.4 to 1.5 per cent. and the fat content about 81.3 to 81.4 per cent. (It has not been found that Alfa butter will carry a higher salt content than normal butter without becoming harsh in flavour.) The increase in percentage yield with the Alfa process then would be 0.4 because of lower fat losses and about 0.6 because of increased curd content, or an increase by 1.0 in percentage overrun. This presupposes, however, consistently-good moisture control.

Quality of Butter

Alfa butter has a characteristic condensed milk flavour which is not unattractive but which lacks the finer qualities of a well-made churned butter. Graded on present New Zealand standards the butter has been classed both by the Wellington and Auckland graders as first grade with occasional classifications as finest. The grade score for most shipments has been from 91½ to 92½ points. Butter made from similar cream by the ordinary process has been graded from 93½ to 94 points. Alfa butter from poor-quality cream such as that delivered during the winter compares well in grade with normally-churned butter from the same cream.



End view of the transmutator showing butter outlet (left) and vibrator table on which boxes are placed when being filled.

Alfa butter is generally close in body and smooth in texture, but there is a tendency to a laminated appearance resulting from the system of filling the box in layers. The butter has also a certain greasiness which renders its appearance on the trier unattractive as compared with normal butter. At cool temperatures this defect is not so apparent, but it is accentuated by moderately-warm temperatures.

Keeping Quality

It is too early to report on the keeping quality of the butter. The bacteria count on Alfa butter is not markedly lower than on churned butter from the same batch of pasteurised cream. Shipments of Alfa butter are being forwarded to England.

Economics of the Process

The power consumed in operating the transmutator is approximately the same as that required for churning butter in the New Zealand type conventional churn. Other studies of the economics of the process in comparison with the system now in use have not been completed.

Summary

The trials have shown that the Alfa buttermaking process has interesting possibilities, but in its present form its adoption in New Zealand factories would involve difficulties in the control of the moisture content of the butter, difficulties in the handling of some types of farm-separated cream, and difficulties in obtaining satisfactory packing of the butter.

The quality of the butter is different in several important aspects from the quality of normally-churned butter. It is hoped that the keeping quality trials in progress and the export shipments arranged will indicate sufficiently the value or otherwise of these differences in quality.

The Alfa trial at this stage must be regarded as an uncompleted experiment and it therefore should be accepted that it is not yet possible to draw conclusions which are final. The factors of type and quality of the butter appear to be the key to the whole question, and it is too early to say definitely whether there is sufficient significance in these factors to justify attempts at extensive modifications of the Alfa process with a view to its possible adaptation to New Zealand dairy factory practice.

FARM WORK FOR AUGUST

By the Fields Division.

PREPARATION FOR SPRING-SOWN CROPS

The extremely-dry conditions which prevailed during the past summer and early autumn in many parts of the country have emphasised the advisability of making provision for succulent greenfeed for stock, particularly dairy cows and fattening stock, during this period. All summer forage crops are spring sown, and the preparation of the land for such crops should be carried out in ample time and should be completed, except for a final discing and harrowing, well before seeding time. Where old pasture land is being used either for summer or even winter fodder crops the breaking up of the turf either by skim ploughing and discing or by discing with weighted discs and a straight-cut before deep ploughing has generally a remarkable effect on the yield of the crop. Far too often no preparatory work is done on the turf, which is turned down intact, the ploughing being left till a week or two before the crop is to be sown. The turf has no time to rot away, but forms a felt between the subsoil and the cultivated soil, which not only prevents the crop plants from rooting deeply, but prevents the surface soil from receiving moisture from the subsoil when dry weather sets in. Though July is possibly the best month for preparatory cultivation work on paddocks intended for spring-sown crops, August is not too late for it, the weather then often being more settled in many districts. For the earlier-sown summer feed crops deep ploughing should be completed by the end of August, the rotting of the turf being helped during September by the moisture in the soil and by rolling in the direction of the furrows before discing. This rolling also helps by pressing the newly-turned soil down on to the subsoil, thus renewing the contact between the two which is essential if good crops are to be secured despite possible dry weather in the early summer.

The early turning over of the land and exposure of the soil to the weather have a considerable influence on the physical condition of the soil and give the soil organisms (bacteria, fungi, worms, etc.) time to convert the vegetable matter buried in the soil into plant food. Heavy clay soils, of course, should be handled with care. Though they should not be ploughed when really wet, the preparatory work of skim ploughing or heavily discing the turf as early as possible is just as important on them. Areas already in a winter crop which are to be used for a summer forage crop before going gack to grass should be ploughed as soon as the land becomes vacant. Too often such areas are left to grow a heavy crop of weeds, which interfere with ploughing and cultivation work later.

SPRING-SOWN PASTURES

In many districts it is possible to resow to grass areas which have been used for winter crops such as swedes and chou moellier. Where such crops have been fed off the practice of discing the land for a seed-bed instead of ploughing is becoming popular, the subsequent take and early growth of the young pasture being generally much better after the discing than where the more usual ploughing is carried out. The advantages of discing are: First a much firmer seed-bed is obtained, the lower layers of soil having been left undisturbed; and, second, the animal manure and crop residues are well worked into the topsoil, where they are readily available as plant food for the young grass. Where the fodder crops have been kept free from weeds by cultivation, as in many southern districts, there is little or no danger of a heavy weed infestation of the young grass when the land is prepared for seeding by discing instead of ploughing. Even where such inter-row crop cultivation is not carried out, the discing method has given such good results in pasture establishment and subsequent growth that the presence of weeds likely to be troublesome in spring-sown pastures has not been of any real significance.

SPRING-SOWN CEREALS

As August and September are the usual months for the sowing of spring wheat, preparation of the land for this crop should be well advanced by the beginning of August. The exact time for sowing the crop depends on the weather, but because the yield of most spring wheats is reduced with each week the sowing is delayed, every advantage should be taken of fine spells to prepare the land for seeding. Tainui is a spring wheat which can be sown much later than other varieties, with prospects of a satisfactory crop, and for this reason it is generally grown on the heavier-clay lands which are difficult to get ready for wheat in early spring. Tainui is therefore often substituted for varieties like Cross 7 when for some reason sowing has to be delayed until as late as October.

Preparation of the land intended for barley and oats should be commenced as early as possible, because a well-cultivated seed-bed and early sowing are just as important for these crops as for wheat if really good yields are to be obtained.

POTATOES

The potato is one of those crops in the management of which careful attention to detail and thoroughness will pay good dividends. If mechanical planters are used to plant the crop, care in the proper grading of the seed is necessary to save delays and to secure an even plant. Uneven grades cause stoppages with the machine and irregular planting. Wherever possible a start should be made by August with the sorting and grading of seed potatoes. Where suitable shelter is available the new season's seed should be set out for greening and sprouting. A proportion of Certified seed should be used, particularly in those districts where it is not advisable to continue to keep home-grown seed for more than a season or two because of rapid deterioration.

Because every advantage should be taken of favourable weather throughout early spring in getting land into suitable condition for main-crop potato planting, August is not too soon to make a start with deep ploughing, particularly of grassland intended for this crop.

PASTURE MANAGEMENT

August is often a critical month for pasture growth, which at this time of the year is very dependent on the weather. To make rapid growth pasture grasses and clovers must have leafage with which to manufacture food. Pastures which are kept continually close grazed and bare of leafage through July and August are always very slow to respond to improved weather conditions, whereas pastures which carry some growth, even only an inch or two, make a much quicker response. To take real advantage of the first movement of growth in the spring and to enable some of the paddocks on the farm to be in a condition to come away quickly, they should be allowed to carry some growth through the winter. This means that by the provision of supplementary feed (hay, silage, or special winter fodder crop) the stock should be confined to a part of the farm while the remaining paddocks are allowed to make sufficient growth to be in a condition to make more rapid growth as soon as warmer weather comes than is possible if all the area is kept close grazed.

A pasture can grow from 4 to 6in. in much shorter time than it can from 2 to 4in. and in very much shorter time than it can from a bare-grazed condition up to 2in. In practice the more the stock can be confined during winter through the provision of supplementary feed and the more acres of pasture land that can be kept unstocked to maintain an inch or two of leafage the greater will be the response in growth and fresh feed of the pastures as a whole to improved weather conditions.

The advantage of some growth on the pastures being able to make more growth rapidly is, of course, lost if the stock are put out as soon as a little growth begins. At this time of year a rule worth remembering is that the longer a pasture can be spelled, the more feed it will produce each day it can be spared. It is far better to carry on with winter feeding a few weeks longer than to start grazing too soon pastures which are making good growth. It is remarkable how much fodder an acre of grass can produce a day even in the early spring if spelled, and the longer the spell the more it produces in a day.

Multi-purpose Trees for Planting on Farms

THE common and easily-procured article is often regarded with indifference and accounted of little value, but on closer scrutiny or in an emergency it may become of service and increase in worth. So it is with certain trees or shrubs which are so common around the countryside that they are classified in the lay mind as weeds and their reason for occurring in a particular place as merely coincidence. However, such species play a big part in the provision of "natural" protection on the face of the land, and they can be used with ease for the provision of controlled and planted shelter under various conditions on many kinds of farms. This article by M. Sutherland, Farm Forestry Officer, Rural Development Division, Wellington, describes the variety of uses other than for timber to which many introduced tree species may be put in New Zealand.

These eucalypts planted in a corner of a field will provide shade and shelter for stock while growing and eventually will supply fence posts or farm timber.

SOME of these trees when introduced to the orderly control of well-farmed lands have tendencies which must be held in check for the farmer to reap the greater benefits offered by the utilisation of their special characteristics. For example, the silver poplar is an excellent tree to plant for holding shifting soil, but by the very abundance and vigour of its suckering habit it becomes a pest when introduced without sufficient supervision on to well-farmed lands. Such trees are to be regarded in New Zealand in the way that the common or silver birch (*Betula pubescens*) is looked on in Scotland as "a good servant but a bad master," as it can be relied on to seed itself on any waste land and is invaluable as "nurse" to planted species if its growth is kept in check so that it does not smother out the desirable trees.

WILLOWS

Perhaps the most widespread type of vegetation in New Zealand, found in practically every district, is the willow association. This family includes species suitable for almost any situation, from the tall-growing crack willow tree 70 to 80ft. high, which can thrive on dry sidings, to the low-growing, bushy, osier willows which most often grow and spread in low, cold, and wet soils, where much of their life is spent with their roots in water.

Though willows usually grow best in moist, low-lying situations, they are accommodating in the type of soil they need, usually succeeding on clay or sand, provided moisture is available, even though it is at a depth. Throughout New Zealand the climate is apparently suitable, but growth is most luxuriant in areas of warmer summers. Though willows are little affected by winds, standing up well to the physical battering, growth is slowed in areas of exposure to continuous, cold sea winds, such as blow in parts of Wellington or Otago Provinces, and the brittle limbs of weeping willow are sometimes broken off in gales.

Shade and Forage

Willows are useful to the farmer for the general purposes of shade and forage, for shelter from wind, and for holding moving land on hill erosion or on river-banks. Willows have been used for shade since the early days, when precious first cuttings were stuck into the ground by drovers as they went through the countryside, and now the weeping willow (*Salix babylonica*) is probably the most widely useful shade tree for the farmer.

Its chief advantages are that it is easy to grow, and a cutting will take root at any time of the year if given moisture. It makes rapid growth once the roots are formed, and when the foliage and even much of the bark of a tree are eaten by stock, as happens in drought years in east coast districts, the tree has vigorous powers of resistance and recovery and by the next season can produce almost as good a forage crop as before. The taste for willow shown by stock makes it often necessary, when willows are first planted on a farm, to protect the saplings until the trees have become established and made a first good growth.

Curiously, the foliage of other species of willow than the weeping willow does not appear to have the same great attraction for stock; if the contrary has been observed the author would be glad to hear particulars.

Willows as Shelter

Almost all species of willow can be used for shelter, either in irregular clumps or in planned windbreaks. Natural lines of shelter are often formed by collections of low willow bushes growing thickly along the borders of rivers or streams, or even in depressions running across level land. These seldom require fencing, do not suffer from the trampling of stock, and are continually renewed and thickened by the vigorous power of sending up basal shoots possessed by all willows. In general such belts on a farm are an asset, and where they become very thick and mixed, with untidy, crossed, and poor stems,

USES FOR WILLOWS ON THE FARM . . .

a short time spent with a slasher and in burning the rubbish removed will be repaid in the appearance and usefulness of such waste areas. Burning is necessary to prevent the debris rooting again on the spot. An objection to such belts is that their margins tend to become dirty with blackberry, which in such positions is more difficult to control.

Though willows are bare of leaves in the winter and therefore do not provide such dense shelter as do evergreen species, the lack of leaves is compensated for to a large extent by a dense growth of shoots branching from ground level. These make a latticework of branches which breaks and disperses wind currents, reducing their velocity beyond the belt. This applies more to the low bush type of willows, as tree types are bare at ground level and, like other high-crowned trees, are of little value for low shelter.

Pussy Willow

The best type of willow for shelter is the common goat or pussy willow, *Salix caprea,* which is common in most parts of the country, growing as hedgerow or ditch bushes or in extensive clumps on poor, waste, or stony land, where it forms thickets up to 20ft. high. The individual tree may have a single stem up to 6in. in diameter, branching at 4 to 5ft. into a rounded crown; more often it forms a rounded bush with many stems rising from ground level and, according to the location and conditions, up to 15 or 20ft. high.

Salix caprea grows well on porous land where its roots have to penetrate fairly deeply to get water, and also on land with a high water table. This characteristic has been taken advantage of on the reclaimed lands of the Hauraki Plains, where pussy willow is widely used to form long windbreaks on farms, and examples of its use in short breaks are to be seen in some districts of Wellington, Canterbury, and Southland Provinces.

The leaf of the pussy willow is broader than that of most other willows, about 2in. long, oval, thick textured, smooth, dull green above, and on the under surface covered with soft down. The flower catkins are well known as "golden palm" and in spring are used for decoration. They are also useful to beekeepers, as unlike other willows this species provides for insect pollination and produces nectar to attract early bees or moths.

Though pussy willow is suitable for use as shelter in belts or clumps when conditions are difficult for the growth of more permanent species, in certain regions it has been declared a noxious weed and therefore the deliberate planting of this species can result in prosecution. The local authorities concerned with this species are the Blenheim, Waipa, and Waikato County Councils, and *Salix caprea* features on the prohibited list of the Papatoetoe Town Board and the Northcote, Raetihi, and St. Kilda Borough Councils.

Willows form an even, compact windbreak which is root firm and semi-permeable and remains an efficient shelter belt even during the short period when the leaves are missing, because of the many fine shoots which spring from the main stock near ground level and spread horizontally as well as vertically to make a close latticework of branches.

In the formation of breakwinds rooted cuttings are best used, planted in early winter with 1 to 3ft. between trees on good land. In reclaimed land they are often planted on the debris of the bank 2 to 3ft. from the edges of the drains.

It is necessary to protect young belts from stock when they are first planted. Trees planted along drains are protected on one margin, and it is advisable to place a protecting fence on the other side at least 4ft. from the trees. An electric fence placed at this distance has been found effective until the trees are well established; after that it can be placed as close as 2ft. from the belt and still be effective as protection from stock.

Like many other woody shrubs, pussy willow can be formed into a serviceable hedge by constant light trimming of the growing tips. This is sometimes useful in positions where it is difficult to grow more orthodox hedge species, but as a hedge it is not recommended, as it tends to become woody and open, is leafless in winter, and is temporary at the best.

Stabilising Ground

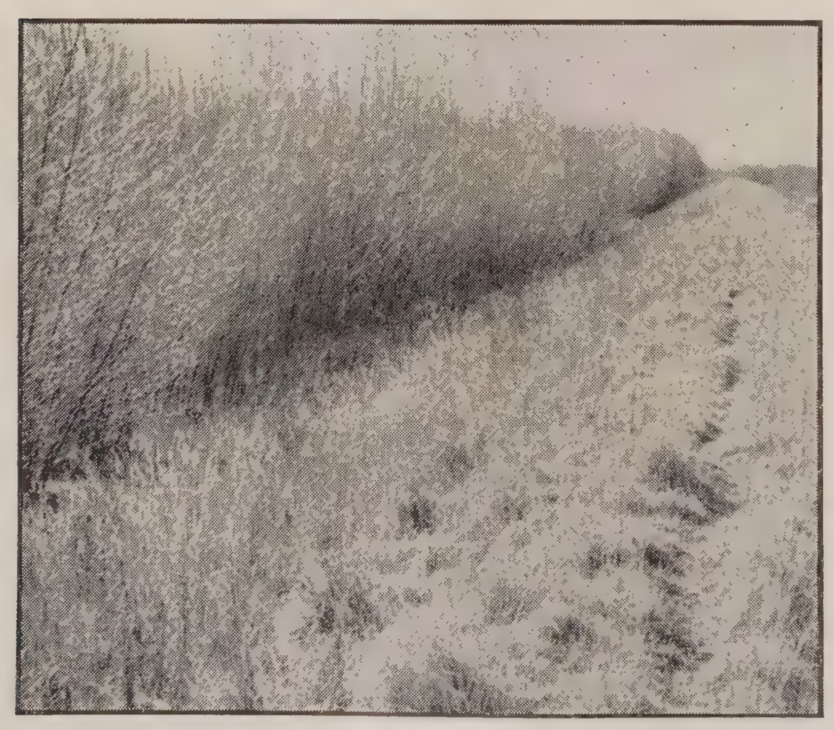
Perhaps the greatest use of willows is for holding and stabilising slipping ground and for checking erosion along river- and stream-banks. Willows are planted for such purposes almost equally with varieties of poplars, but an advantage of willows for this work is that they form a low, spreading thicket, which in many situations is preferable to the growth of tall trees such as poplars or crack willow. Such a thicket also serves as low shelter.

Harmful Effects of Willows

Despite their usefulness, willows on farm lands have many disadvantages, as a characteristic of this genus is its ability to grow rapidly and to propagate itself easily from cuttings. Any twig or root will produce roots and sprout strongly even when left lying in contact with damp ground, which accounts for the prolific growth of willows in any area to which they are introduced and constitutes their chief disadvantage.

Big, old willows may be useful or harmful when growing along riverbanks. Bent trunks can be in such a position that they form a kind of open groyne behind which debris collects and forms a dam to slow up the flood water, and by the deposition of this rubbish the surface of the land is gradually raised. On the other hand, great damage may be caused when a tree trunk forms a solid barrier and diverts the mass of water so that a new channel is scoured out by the swiftly-flowing current.

In much the same way the prolific root formation of willows may become a menace. A thick mass of fine roots is formed about water level, and though swift water will pass through, in slow-moving streams or swampy land these roots accumulate fine silt



[*Public Works Department photo.*

Osier willows make excellent low shelter, as well as stabilising the land in low-lying areas.

The weeping willow *(Salix babylonica)* is easy to grow and an excellent tree to provide shade in all parts of the farm.

and debris, which collects upstream of the tree and forms a bank; the passage of water is slowed and in time the general level of the ground is raised. This certainly stabilises the land and stops scouring out of streams, but there is danger when willows are used close to drains where the flow is not swift. The extensive layers of silt and roots formed may finally block the passage and raise the level of flow so that the water is dissipated over the surface and drainage of the area is prevented.

Willows, unlike pines, are useless for planting to clean up weedy land. Being leafless in winter they do not give shade strong enough to destroy the growth of weeds beneath them.

Eradicating Unwanted Willows

The chief disadvantage of willows on the farm is their tendency to spread and the difficulty of keeping this spread in check because of their tremendous power of root formation. When a willow tree or bush is cut even to ground level new, vigorous shoots are sent up from the stump, and there is thus great difficulty in eradicating the tree. One way to deal with this is to ring-bark the tree or each main shoot as low as possible in the summer and paint the surface with a 5 per cent. solution of sodium chlorate. If shoots grow from below the ring, they should be cut off as soon as they sprout and the surfaces of the cuts again poisoned. This action should weaken the tree, and it may die by the next season. Great care should be taken when dealing with this chemical, as clothing impregnated with it may burst into flames if stored without first being rinsed thoroughly in water.

A more effective method is a combination of ring-barking and arsenic poisoning. The main stem is chipped with downward strokes, girdling it as near the ground as possible, but leaving the chips attached at the base to form a cup; into this is poured the poison solution and the tree is left thus. This operation is most effective in preventing the growth of suckers if treatment is carried out in the late summer or autumn before the short dormant season. The trees may die in a few weeks or earlier if they are small.

The poison is prepared as follows: 1lb. of white arsenic is mixed to a paste with a little water and then added to a solution in water of 3lb. of washing soda or 2lb. of caustic soda. The arsenic and washing soda may then be boiled in one gallon of water. For small quantities caustic soda may be used, and the mixture will generate enough heat in the water to dissolve the arsenic without the need for boiling. When washing soda is used the solution should be placed in a vessel which will hold about three times the volume of the solution, because it froths up very much when being boiled. Boiling should be continued until all the arsenic is dissolved, and if the solution threatens to boil over, a little cold water should be added.

When the boiling is completed the solution is made up to four gallons with water and is ready to use. One quart of solution is sufficient to treat a tree about 4ft. in diameter. Great care should be taken during the preparation of the solution not to breathe in any fumes, which are exceedingly poisonous, and to set apart the vessels in which it is prepared; the poison remains in the metal, so the tins should never be used for watering or feeding stock. Cattle have been fatally poisoned by drinking from tins contaminated by arsenic solutions.

Where possible it is as well to keep stock away from areas where trees have been poisoned for a few weeks in case they are tempted to lick the treated stumps.

POPLARS

Five species of poplar are common in New Zealand, but only three are of importance for farmers. Most widely known is the Lombardy poplar (*Populus nigra* var. *fastigiata*), which is of Himalayan origin; the silver poplar or abele (*Populus alba*) appears sporadically in waste places; and the black poplar (*Populus nigra*) and related species, *Populus deltoides* and *Populus serotina*, grow into good trees in certain parts, the timber being used for farm purposes.

In common with willows, all poplars grow easily and rapidly; when felled they sprout again readily from the stem, and some species reproduce freely from root suckers, silver poplar being the most commonly troublesome in this respect. Like willows, poplars grow extremely easily from cuttings, and even poles 5 or 6in. in diameter will produce roots and grow if given suitable soil and moisture conditions.

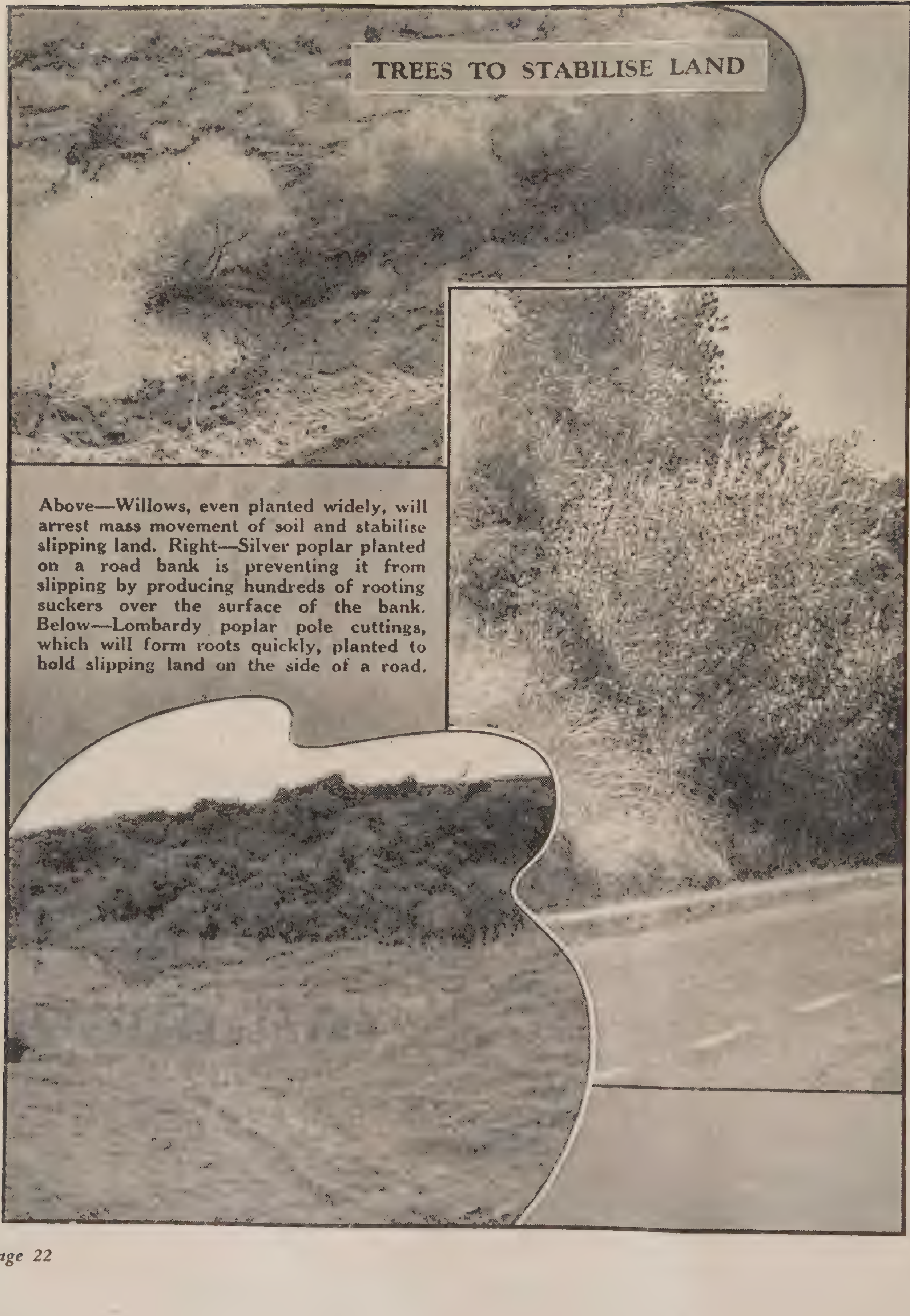
Poplars are not exacting about growing conditions, and the Lombardy poplar adapts itself in nearly all parts of New Zealand, though best conditions for its growth are on moist, deep and preferably silty soil. They are most successful in the warmer areas of the North Island and thrive well in the heavy soils of North Auckland, but they have also proved one of the most successful trees in the dry soils and cold climate of the Canterbury Plains and Otago. They are unthrifty on acid or peat soils.

Climate seems to have little effect on the growth of either Lombardy or silver poplar. They are frost hardy and withstand cold and wind; the fine, close branching producing the characteristic, compact, spire-like shape of the Lombardy creates a typical semi-permeable barrier which can resist an onslaught of gale force, and this is assisted by a spreading system of very long branch roots.

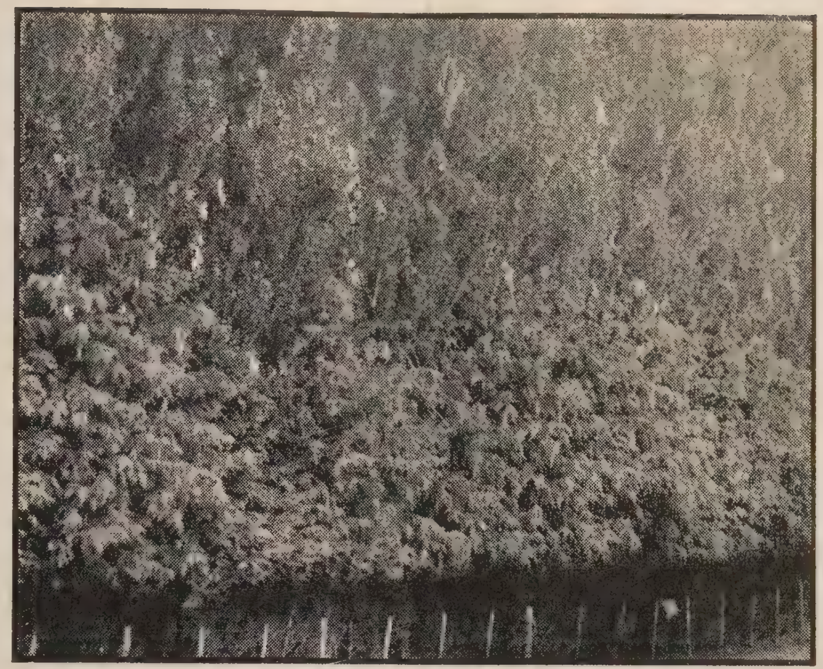
Poplars for Windbreaks

The chief use of the Lombardy poplar is as a windbreak. It can be planted alone either as a single row, or in a double row with the trees of one row alternating with those of the second, with a distance of 6 to 9ft. between rows and with 5 to 8ft. between trees, the wider spacing on good soils. After the first year or two the poplar sprouts from low on the stem,

TREES TO STABILISE LAND



Above—Willows, even planted widely, will arrest mass movement of soil and stabilise slipping land. Right—Silver poplar planted on a road bank is preventing it from slipping by producing hundreds of rooting suckers over the surface of the bank. Below—Lombardy poplar pole cuttings, which will form roots quickly, planted to hold slipping land on the side of a road.



A belt of Lombardy poplar with *Cupressus lawsoniana* as low shelter to fill up the base. The fence is too close to the trees, and browsing by stock will soon open up the cypress belt, which in time will become ineffective.

forming a certain measure of ground shelter, and in short lengths of belt, such as those around orchards, that is often encouraged by trimming back the shoots, which will sprout freely again, thickening the barrier.

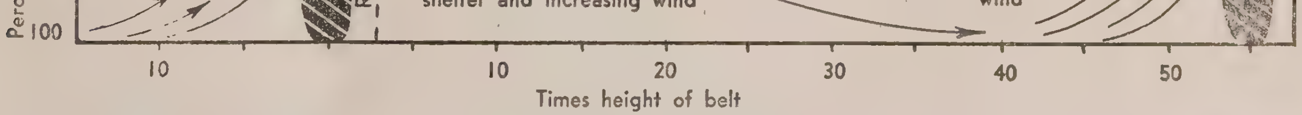
Usually the thickest crown forms about one-third of the way up the tree, and in double rows, where great height is not desired, a good practice after the trees have reached about 20ft. high is to top each line alternately at intervals of four or five years, reducing each tree to 2 or 3ft. The stem branches freely from there, forming a branchy, thick base, and then puts on height growth and acts as shelter when the second line is topped, so that there is no complete loss of shelter at any time. With this method, of course, the poplar is never allowed to attain its full height growth.

A less laborious plan where height growth can be allowed is to let the poplar grow naturally to the full height, which may be 80 to 100ft. on good land, and to provide the ground shelter by planting another species with it. This may be a hedge 2 to 3ft. from the poplars, which, being deciduous and of a narrow-crown habit, allow sufficient light below for the successful growth of such hedge species as barberry, privet, boxthorn, or eleagnus. As an alternative, the belt may be made up of two more widely-spaced rows, say 6 to 8ft. apart, the alternating line being of either ***Cupressus lawsoniana*** or ***Cupressus benthamii***, which will give basal shelter increasing in height, or of New Zealand flax (*Phormium tenax*) or pampas grass, which provides a thick, low shelter. Such a belt is economical of space and can be planted safely on a 20ft. strip, allowing 3 to 4ft. or less between poplars and fence on one side and 8 to 10ft. between the fence and the under species. Still less room is necessary if eleagnus or boxthorn is planted either between the poplars or on a line about 2ft. away; with these species stock damage is not harmful and they will grow upward into the branches of the poplars rather than outward.

The use of Lombardy poplar in windbreaks illustrates very well the theory of wind deflection. The air current approaching a line of tall poplars is felt strongly almost up to the line of trees; on meeting this barrier it is carried upward and over the tops of the trees, and its increase of power on the calm side follows a long, slow curve until it again reaches full force at ground level. Thus a strip of land immediately in the lee of the belt is in comparative calm, and its width increases with the height of the shelter trees. Almost 100 per cent. shelter conditions can be obtained in some paddocks by placing successive poplar belts at appropriate distances. When the formation of such a windbreak is contemplated observation of a similar area in the vicinity which is influenced by tree shelter will indicate the distance at which calm obtains, and thus show the best distance at which to place new belts for a similar result.

Such poplar belts are easily grown by using cuttings struck and grown in the farm garden to about 3ft. high in one year. They should be planted at least one-third of their length deep and well rammed in. A line of Lombardy poplar may be used as auxiliary fencing, as it is not very liable to damage by stock. Old trees can act as strainers or posts, and if young poles are placed at intervals in a fence, they

WIND DEFLECTION BETWEEN SHELTER BELTS



The distance affected by wind is usually expressed as units of the height of the wind barrier; one unit of distance is equal to the height of the trees in the belt and 10 units are equal to 10 times the height of the trees. In the diagram the supposed shelter belts are placed to give some degree of shelter over the maximum of area between them.

Lombardy poplars planted singly in a line, as above, grow bare trunks and may be draughty below, but with a low hedge planted alongside to give ground shelter, as shown below, they form an efficient belt.

will hold the wire and also before long will take root and sprout at the top, producing a useful hedgerow shade tree. When removing a belt which has been used thus as a fence, care must be taken that tools are not damaged by striking wire or staples embedded in the timber. A wooden batten should first be nailed to a tree which is to be used as a post, and the staple over the wire driven into that, so that the batten will move outward with the growth of the tree, and thus no wire should be embedded.

Control of Erosion

Poplars can be used in countering erosion of areas of farmland or gullies, but details of this aspect rightly belong within the scope of an article devoted to erosion control.

However, at the first sign of land movement excellent first aid can be given the land by planting in the soft earth for about two-thirds of their length a few cuttings or poles of Lombardy or other poplar. These will quickly form roots and hold the soil particles in the meshes so that a solid mass is formed at that point, and that arrests the slide of soft, moving soil above it. Groups of poplars planted thus primarily as protection from soil erosion also act as shelter blocks and as shade trees.

Troubles with Roots

Lombardy poplar on farmland usually does not sucker unless the roots are cut in cultivation, and even then the shoots seldom become a nuisance, but around houses the tremendous spread of roots may become a menace, as they can run for several hundred feet and sucker where disturbed, perhaps in an orchard or garden.

The best preventive is to dig a trench, 4 or 5ft. deep, between the tree and neighbouring objects, cutting through all roots encountered. If the poplars are tall, the trench should not be nearer than 10ft. from the trees, and care should be taken not to trench on the windward side, as that will sever the anchoring roots and there will be danger of the tree falling in the wind.

Other Poplar Species

Other poplar species which may be of importance to the farmer are the black poplar (*Populus nigra*) and allied species of aspen. The black poplar is a tree of spreading habit, growing rapidly in 20 to 25 years to a height of 60ft.; the leaves are triangular and shining, of a golden-pink tinge in the spring and becoming deep golden in autumn. The rapid growth and beautiful foliage colourings make them good trees to have mixed with conifers in a homestead shelter belt provided they are so placed that no danger is incurred from their habit of dropping branches in wind. Mature, well-grown trees find a ready market now as peeler logs for the manufacture of wood veneer, and also as box timber.

Aspen (*Populus tremula*) and the quicker-growing and hardier American aspen (*P. tremuloides*) are distinguished easily by the manner in which the leaves are continually fluttering even in calm weather because of their elongated and flattened leaf stalks. Their use is mainly as shade trees when planted alone, for variation in mixtures of evergreen shelter belts, and to fill in moist spots. Their roots tend to run horizontally below the surface of the ground, and the trees are not very wind firm.

Populus yunnanensis is an imported Chinese species which promises to be valuable in some types of shelter planting. The leaves are larger than those of the common poplars, with a red midrib and stalk, and are retained on the tree for a long time, the period of bareness being reduced, in the North Island at least, to only about two months. The tree grows rapidly in the Hastings district of Hawke's Bay, reaching higher than 30ft. in nine years, and rather more slowly in parts of North Canterbury. It is apparently hardy, but more information is required about its behaviour further south and in frosty conditions. This species does not retain its lower branches, and is probably of most use when planted in association with a low evergreen shelter species such as *Cupressus lawsoniana* or *Cupressus macrocarpa,* where it gives rapid height to the belts. In such mixtures care must be taken to give sufficient growing space or to side trim the strong poplar growth periodically. Poplar and cypress should be planted about 9ft. apart.

This poplar and its allied species *Populus robusta,* which is also quick growing, make good shade trees when planted as field shelter or as single trees, but they require adequate protection against stock. *P. yunnanensis* grows well from cuttings and very quickly develops a widespreading crown so that in some positions with restricted space it is considered less satisfactory. However, like most poplars, it should be a good humus producer on poorer soils, and it does not sucker from the roots.

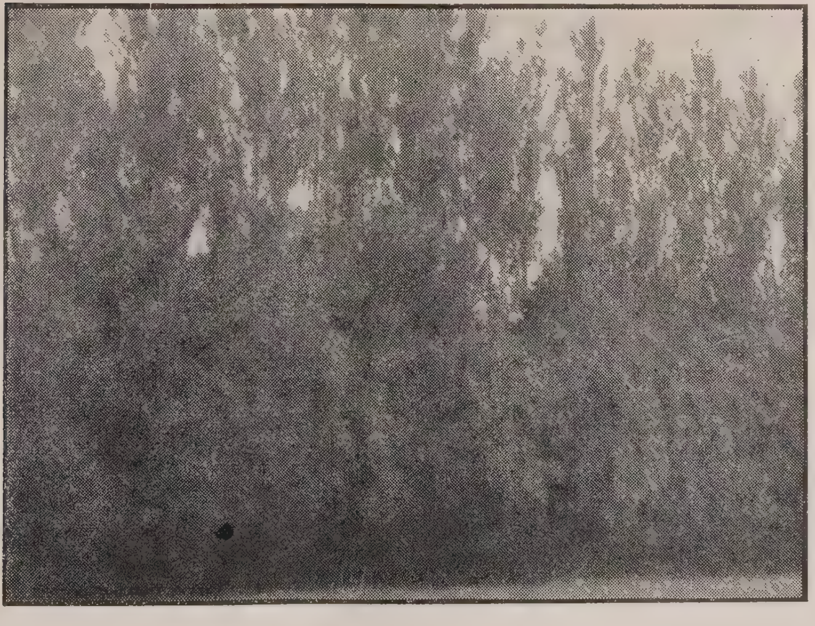
Populus yunnanensis **quickly forms heavy crown shelter, but the stems are bare. The stems of these nine-year-old trees are 10in. in diameter.**

Silver poplar (*Populus alba* var. *nivea*) is a tree of doubtful merit in good soils, but is often of value on slipping waste areas in poor or sandy soils where it is difficult to establish other tree growth. It is easily distinguished by its white bark and the silvery appearance given to the tree by the thick, white felt on the under surface of the leaves, and by the shape of the leaves, which resemble those of a maple rather than of a poplar. This species may form a tall, spreading tree, but more often it is found in colonies of small trees up to 30ft. high formed from the prolific root suckers. This suckering habit is of value to hold a slipping bank of a roadside; if cuttings about 2ft. long are spaced 2 to 3ft. apart, the soil is soon bound by the root system, and in less than 12 months a close growth of saplings will form over the area. That is particularly useful on road cuttings made through sand.

Like pussy willow, but with much greater reason, silver poplar has been declared a noxious weed by several county councils and boroughs in both the North and South Islands.

The suckering habit is a menace on farmland or orchards, and silver poplar should never be planted near orchard land, as it is almost impossible to eradicate it. Suckers which appear in a lawn are held in check as long as it is kept mown, and where sheep can be kept on ground in which root suckers occur they will be kept down. Otherwise this tree presents a more difficult problem than willows, as the roots apparently send up suckers to the surface wherever the ground above them becomes very thin, so that poisoning the main trunk, as described for willows, is not effective unless accompanied for more than one season by constant browsing or mowing, and even then infestation may start again later.

Trials are in progress to test the influence of hormone weedkillers used in varying ways on the root systems of suckering trees, but no successful solution has been found yet.



Eleagnus, planted as low shelter at the base of a belt of Lombardy poplars, scrambling upward on the poplars.

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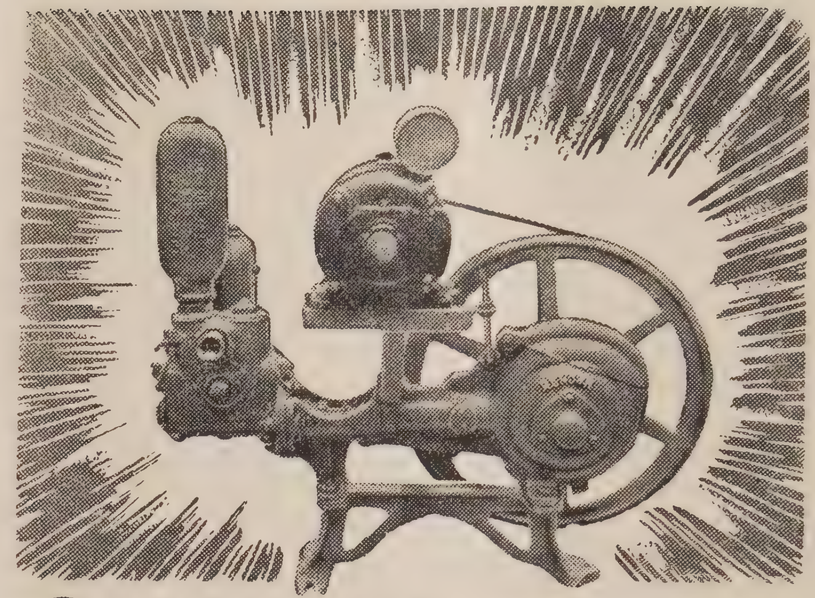

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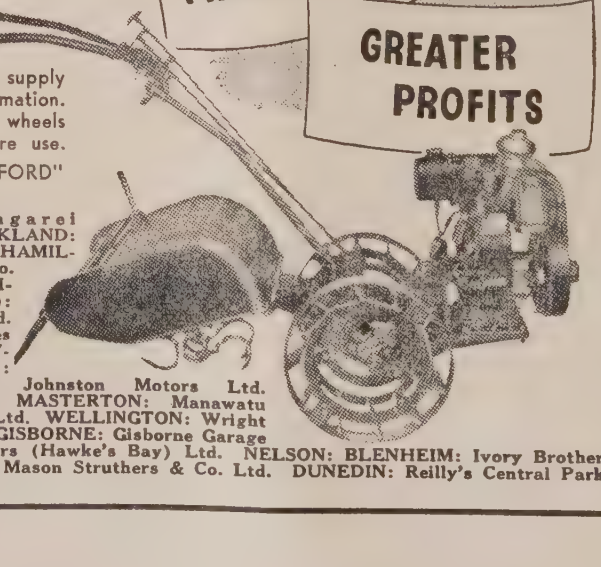

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BEES IN IRREGULAR SHELTERS A DANGER TO INDUSTRY

By E. SMELLIE,
Apiary Instructor, Christchurch.

HONEY bees established in the walls of buildings, hollow trees, or in box hives other than movable-frame hives are a potential danger to the beekeeping industry in New Zealand, as, not being under proper care, they may become diseased and, particularly because of the propensity of bees in such locations to swarm each year, spread infection to neighbouring apiaries.

SWARMING is an inherited instinct of honey bees and is a means of preserving and propagating the species, but in modern apiary practice swarming is unnecessary and undesirable; consequently all competent beekeepers endeavour to prevent swarming of their bees as far as possible.

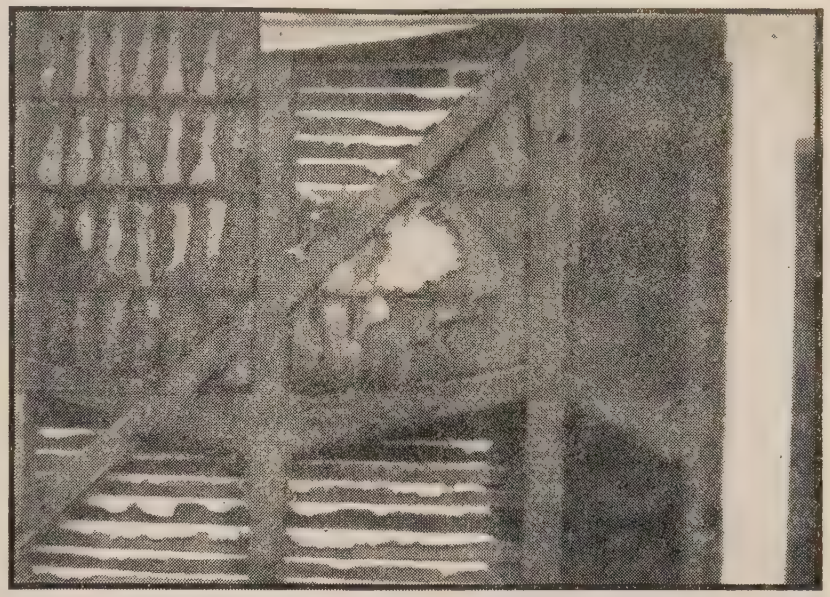


Fig. 1—Weather-boards removed from a house to reveal a colony of bees strongly established in the walls.

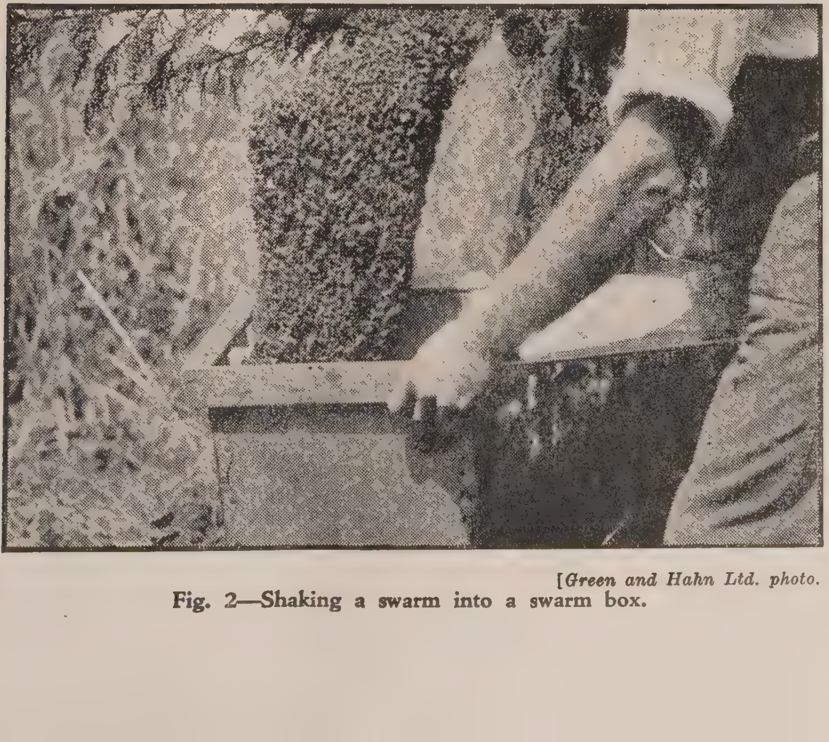
Swarm Every Season

Most bee colonies established in buildings, trees, or illegal box hives cast at least one prime swarm each season and often smaller ones which usually fly off and establish themselves in similar locations.

Swarms usually cluster on some nearby tree, fence post, or shrub before flying off again to some chosen location where they intend to establish themselves permanently.

The desire shared by most people not to allow anything of value to escape often inspires the finder of a clustered swarm to capture the bees and place them in some handy box (Fig. 2), which he usually accomplishes without being stung, as the bees are good tempered and easy to handle during the first few hours after swarming.

The comparative quietness of the bees when handled at this time often creates initial confidence in the handling of bees. This factor, together with the interest already aroused by the arrival of the swarm, encourages the finder to commence keeping bees as a profitable hobby, and often results in arrangements being made to accommodate the bees in a regulation hive equipped with movable frames and for the registration of the new apiary. Unfortunately this is not always the case, as sometimes the enthusiasm which prompts the capture of a swarm begins and ends as soon as the bees have been placed in a box hive, the keeping of which is illegal.



[*Green and Hahn Ltd. photo.*

Fig. 2—Shaking a swarm into a swarm box.

Movable-frame Hives

Movable frames in a hive are essential to enable the beekeeper to keep a check on the condition of his bees and to make a regular inspection of the brood nest for disease control purposes.

The provisions of section 6 of the Apiaries Act, 1927, are important and should be known to every property owner, as they provide for a heavy penalty for allowing bees that may have become established in any hive other than one with movable frames to remain after notice to remove them has been issued by an inspector. Bees that have established themselves in buildings or other irregular shelters must also be removed or destroyed to prevent the possible spread of bee diseases.

The wisdom of these provisions is readily appreciated when it is realised that American foul brood is very contagious to bees in the larval stages. Unless bee colonies which are infected with the disease are quickly discovered and the disease eliminated, they remain a continuous source for the spread of infection to other colonies of bees within flying radius. American foul brood contracted by hive bees in this way involves the owners of commercial and domestic apiaries in a recurring disease incidence, causing considerable financial loss and much trouble in the management of apiaries.

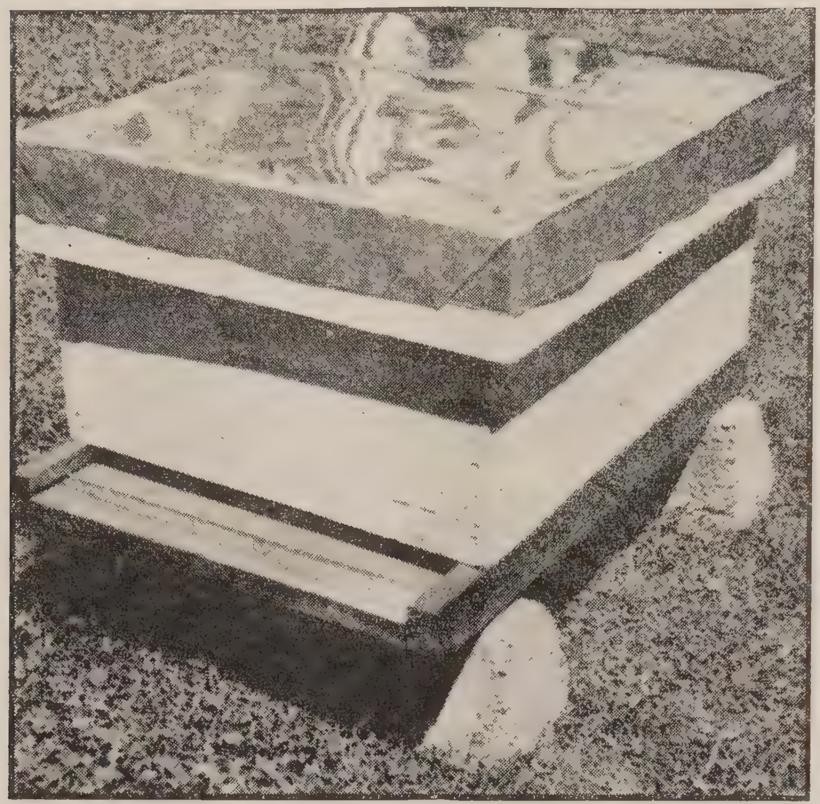


Fig. 3—A standard hive complete with frames, bottom board, and cover ready to receive the bees.

[Green and Hahn Ltd. photo.

Fig. 4—Bees being transferred from a box hive to approved equipment may be dislodged by giving the box a sharp dump at the front of the prepared hive, which they enter immediately.

All owners of property on which bees have become established in buildings, trees, or in rock crevices should therefore take steps to have them removed by a competent beekeeper immediately they are discovered, or communicate with the Department of Agriculture's Apiary Instructor for the district for advice. This action is essential to prevent further swarming of unattended colonies and the possible spread of bee diseases.

Transferring Bees

Any competent beekeeper could determine whether bees established in a box hive (without movable frames) are worth saving. If there is the slightest trace of infection with American foul brood (*Bacillus larvae*), the box and complete contents, including the bees, should be destroyed by fire immediately.

The transferring of disease-free bees from a box hive to approved hive equipment is best done on a fine day when most of the bees are out working in the fields. There are then fewer bees on the combs to contend with and less chance of interference from robber bees. A standard hive complete with frames, bottom board, and cover (Fig. 3) must first be prepared to receive the bees. The box hive should be removed to one side and the prepared hive put in its place. The best pieces of comb should then be removed from the box hive and cut to fit neatly into new empty frames secured in position with string or rubber bands fastened round the top and bottom bar of each frame.

Frames containing brood are placed in the centre of the new hive, while those with honey only are placed to each side. Any remaining space should be filled with frames wired and fitted with full sheets of foundation.

A little smoke gently applied as the work proceeds will cause the bees to retreat gradually from the nearest combs and finally cluster at the back of the box. When the work of transferring the combs is completed the remaining bees can be easily dislodged by giving the box a sharp dump at the front of the prepared hive, which they enter immediately (Fig. 4) and carry on in their new home. Any pieces of comb left over may be burnt or removed for boiling down with other wax combs if there is sufficient of it for this purpose.

There is practically no loss of bees with this method of transferring. The brood present induces the bees to settle down quickly in their new surroundings, where they progress rapidly.

If more detailed advice is required for the elimination or transfer of bees established in quarters or under conditions which do not comply with the Apiaries Act, the district Apiary Instructor should be communicated with as soon as possible. It is important to report the presence of bees where they are established on any property in any other than approved hives.

Bulletin No. 242, obtainable free from any district office of the Department of Agriculture, describes fully bee diseases and methods of treatment.

Rearing of More Dairy Heifer Calves Necessary

THERE is every indication that New Zealand's dairy products will be unable to satisfy the demand for years to come. Increasing sales of milk in urban areas throughout New Zealand call for an even greater amount of total production to be set aside for this purpose, and greater recognition in Britain of the importance of milk as one of the "protective" foods has led to much greater diversion of whole milk to the milk market in that country, which means that butter production will be reduced correspondingly. This article by D. Marshall, Livestock Superintendent, Palmerston North, emphasises the importance of an increase in the number of heifer calves kept during the next few years and offers advice on their rearing.

THE New Zealand Dairy Board's records indicate that during the past 10 years the number of dairy cows in the Dominion has decreased progressively by about 100,000. A slight recovery in 1944-45 was all but lost in the following season. Over a number of years the Dairy Board, on reasonably-reliable data, has estimated the over-all annual wastage from New Zealand dairy herds at about 20 per cent. In many herds the calves kept for rearing are sufficient only to meet expected wastage in that herd. Obviously, to meet foreseen requirements the dairy industry must continue to expand. While some increase in production can come from better feeding of the present numbers of dairy cows and from improvement of their producing capacity by breeding, much of the expansion must depend on increasing the total numbers. Especially does that apply in districts where, by pasture improvement, a process going on steadily, the carrying capacity of much dairying land is raised further.

It is not proposed to go into the perennial controversy about the economics of rearing replacements versus purchase of in-calf heifers at about 18 months of age. In many cases, such as those of certain suppliers of whole milk to towns, buying replacements may be a necessity, but for the average factory supplier there must be obvious advantages in having heifers from his own herd, particularly if it is a good producing one, coming in as replacements.

Last spring the price of reasonably-good yearling heifers in Taranaki was £10 to £12 and for springing heifers last July or August £15 to £17. It is doubtful if the cost of rearing to those ages would nearly approach those prices. There is thus a good outlet for the disposal of any surplus reared and a margin for anyone with grazing available to carry on yearlings until the following spring.

Those factors indicate that any expansion of the dairy industry must be based on an increase in the number of dairy heifer calves kept and reared during the next two or three years, and that rearing additional calves should be a profitable undertaking, apart from the moral duty on everyone in this country to increase food production.

Choosing Calves to Keep

The dairy farmer naturally selects for his own rearing calves from his most productive cows, which should be well known to him from his herd-testing records. A town-milk producer who kept calves would consider quantity of milk as well as butterfat production. A plea should be entered for the calves from the older cows in the herd. Even if the dam's annual production hardly measures up to that of the best in the herd, the fact that she has survived the hazards of a number of milking seasons indicates that she is likely to transmit to her offspring the stamina and reduced susceptibility to disease which will make it in turn profitable. The cow which calves regularly year after year and maintains good average production is a better investment than the "flash-in-the-pan" type.

Calves weakly at birth should be regarded with suspicion, though weakness may not mean constitutional weakness. Calves with obvious defects likely to affect later production should be discarded.

Some prejudice exists against keeping calves from heifers, but tests have shown that, though smaller at birth, such calves develop equally with those from older cows. A possible objection is that, as heifers usually calve later, the weaning stage may fall during the dry autumn period. There is a feeling that early weaning, so that the weaners are on grass before the dry spell, gives the best results. This is not an insurmountable difficulty.

Calves from cows subject to recurrent attacks of mastitis should not be kept. Indications in Blake's work at Hamilton, which are borne out by investigations of the herd-recording branch of the Dairy Board, suggest that there is at least a strong possibility that heifers from such cows will prove more susceptible to the disease.

Paddocks and Housing

Having decided the maximum number of calves he can keep, the farmer must consider feeding, accommodation, and, what is almost equally important, convenience for feeding. Where undue time has to be spent in feeding or milk must be carried too far this work tends to become burdensome. Practices vary widely throughout the country because of climatic conditions. In most of the North Island calves will do very well outside from birth, though it may be desirable to tie them up for the first few days. The ideal is probably two dry, sunny, well-sheltered paddocks convenient to the milking shed, with ready access to a properly-concreted feeding pen or a place with feeding bails and separate buckets. The paddocks can be used alternately at intervals of two

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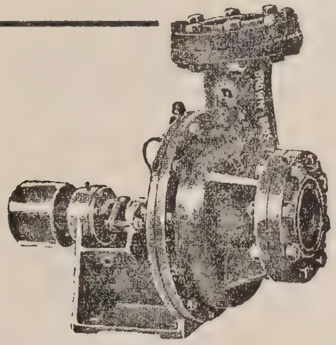

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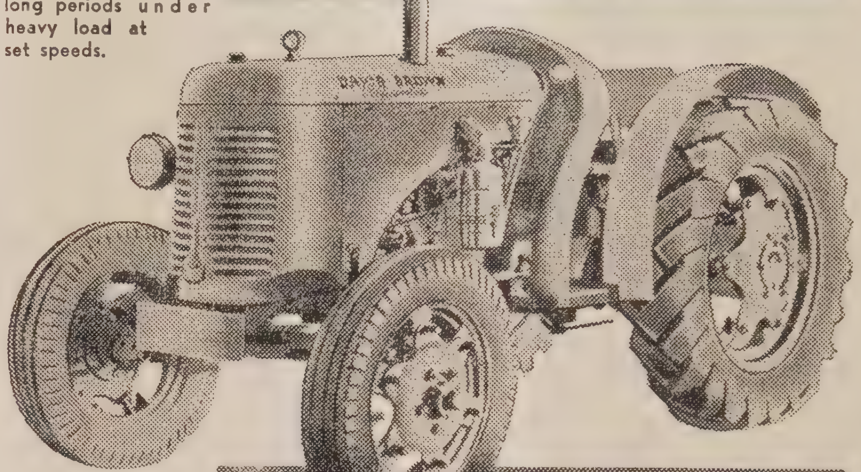

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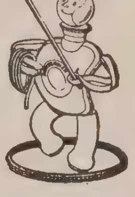

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REID NEW ZEALAND RUBBER MILLS LTD., GREAT SOUTH ROAD, AUCKLAND.

["*The New Zealand Farmer*" photo.

A feeding place with bails and separate buckets is recommended for calves.

or three weeks. Calves can be retained in the bails as required and individual feeds supplied conveniently.

The permanent calf paddock is open to criticism as being a reservoir for the larval forms of worms and other internal parasites, and changes are desirable. Frequently only one paddock is sufficiently convenient to the shed, but if it is kept free from young stock during the balance of the summer and autumn, well eaten out, and limed a month or so before it is required again, some of the risks are reduced. Where the paddock does not have natural shelter, such as a good, close hedge on three sides, an open-fronted shed facing the sun will provide shelter.

In southern districts or bleak, wet localities it may be necessary to house calves for the first three or four weeks. To shut up a number of young calves loose in a large, dark shed is to invite the rapid spread of any infectious scour that may develop in one. Owners of pedigree animals usually provide each calf with a small pen inside the shed, within which it gets exercise while having no contact with others. That entails expense and, where it is impracticable, rather than leave calves loose they should be tied separately round the walls of a suitable shed, which should be open to sunshine but free from draughts. Bedding should be changed as required and conditions kept as clean as possible.

Individual feeding buckets should be used and kept regularly scalded and clean. Calves can be reared satisfactorily by the use of a single large feeding trough if the feeder stands by and ensures a reasonably-even distribution by using a long stick, but more often that system is not satisfactory; fast drinkers get too much and timid calves are chased away.

Feeding the Young Calf

If the calf is left with its mother during the first 48 hours, it will get the colostrum or beastings, which has a useful laxative effect and contains protective substances likely to increase the calf's resistance to certain infections, such as scour.

The calf should be treated like a human baby in that any utensil through which the milk passes before it is fed should be clean and sterilised. A calf fed from a bucket hurriedly rinsed after a mastitis case has been stripped into it may develop serious diarrhoea. Cleanliness is particularly important during the first week.

The milk should be limited to about a quart a day in two or three feeds for the first two or three days, then steadily increased to a gallon a day, which can be increased to 1½ gallons or a little more after the first two months. Though there is little doubt that feeding the same quantity in three feeds instead of two reduces indigestion and scours, the extra labour necessary makes it impracticable except with valuable stock or in special circumstances.

The Dairy Research Institute's Dairy Board report for 1946 showed that excellent results were obtained with Jersey calves by feeding whole milk for three to four weeks, then skim-milk at the rate of 10 per cent. of body weight with a maximum of 2 gallons a day, with rotational grazing in good pastures.

The Dairy Board's report for 1946 gave some interesting and useful figures collected by consulting officers on calf wastage among calves intended for rearing. This is a preliminary investigation, but is worth notice by all interested in calf rearing. Of the total deaths in the first year 57 per cent. occurred at birth and 18 per cent. in the first week. That would indicate that the first week is the most critical in the young calf's life, and that a little more care and attention at that stage, perhaps in housing or feeding, might save many well worth keeping.

Of total deaths in heifers after the first week 38 per cent. were attributed to scours. Much of this is the result of indigestion caused by feeding errors, too large a feed, irregular feeding, dirty utensils, or infection picked up by such means as eating contaminated bedding or pasture or drinking at dirty puddles.

Whey-fed Calves

Suppliers to cheese factories must rely on whey as the basis of their calves' diet. As whey is deficient in both butterfat and flesh-forming substance, it requires supplementing with a suitable protein food. Meat meal has been found satisfactory and there are proprietary balanced calf meals which give good results. The preliminary period on whole milk is important, and the change to whey should be made gradually, small amounts of meat meal being added at first.

A useful table issued by Canterbury Agricultural College some years ago showed the amounts fed and the rate of change from whole milk to whey. Calves had whole milk for 10 days, whole milk, whey, and meat meal for the next 10 days, and from three weeks on received whey and meat meal only, on the following scale:

Age of Calf	Whole milk	Whey	Meat meal
Days	**(pints)**	**(pints)**	**(ounces)**
2	2¼	—	—
4	2¾	—	—
6	3	—	—
8	3¼	—	—
10	3	¾	½
12	3	1½	¾
14	2¼	3	1½
16	1½	4	2¼
18	¾	5	2½
20	—	6	3
22	—	6½	3¼
24	—	7½	4
26	—	9	4
28	—	9	4
30	—	9	4
Weeks			
5	—	9	4
6	—	10	5
7	—	10	5
8	—	10	5
9	—	10	5
10	—	12	6
11	—	12	6
12	—	10	5

Access to good grazing after the calf is three weeks old will compensate to some extent for lack of protein in the whey.

Weaning

Usually calves are finally weaned from skim-milk or whey feeding when about four months old. For calves which are on good grazing at this time and have been trained to eat a little hay, weaning—a critical time for any young animal—may not prove upsetting. They should be fed once a day for a few days and a supply of good drinking water kept available, as they miss the liquid as much as the solid constituents of the milk feed. The average dairy farm may not allow

DISEASES OF CALVES . . .

much choice of paddock, but one from which a hay crop has just been taken may be available.

From weaning time until March calves do well as a rule. With the autumn rains parasitic trouble may appear. On certain farms it may be in evidence even earlier, and a drenching programme is necessary from weaning time onward. In any case this should begin not later than the middle of March and drenching should be carried out every three to four weeks. Parasitic disease is insidious, and once an animal is debilitated by worms drenching may fail to save its life. Any reliable worm remedy may be used.

Good nutrition is almost as important as drenching in combating parasitic disease. During the late autumn, when the pasture growth may be soft and lush, good hay should be available. The feeding of a concentrate of some type, even as little as ½lb. a day during the winter, is of benefit.

At the Animal Research Station, Ruakura, it was found that calves run ahead of the cows in rotational grazing did better and contracted a much lighter parasitic infection—drenching was unnecessary—than those confined to permanent calf paddocks.

Calf Diseases

Some notes on the causes and treatment of calf diseases which occur in New Zealand follow:—

Infectious White Scour

A condition occurring in young calves within a few days of birth, infectious white scour is not as common in New Zealand as in older countries. It is a bacterial infection which is more likely to be found where numbers of calves are kept together, where permanent housing is used, and where sanitary conditions are faulty. Apparently it is influenced by the diet and health of the cows before calving. Treatment is often unsatisfactory. It is recommended that newly-born and healthy calves be kept away from those infected and from contaminated houses and yards.

Most of the white scour occurring in New Zealand has its origin in indigestion caused by overfeeding or faulty feeding, though bacterial infections also play a part. Affected calves lose condition rapidly and deaths are common.

The milk ration should be stopped for a day, allowing a little water to which a small pinch of salt is added; a diet of half milk and half water may be resumed the following day. If medicine is required, 2oz. of castor oil or raw linseed oil with a level dessertspoon of baking soda and a few drops of carbolic, shaken up with 1oz. of water, may be given. Limewater (made by mixing a shovelful of burnt lime in a bucket of water, allowing it to settle. and using the clear top fluid) is useful for the checking of an outbreak if added to milk at the rate of ½ pint a calf.

In older calves scouring may be set up when they begin to eat soft spring grass. Consumption of this grass should be restricted and a small ration of hay fed.

Red Water

A number of calves may die rather suddenly and unexpectedly from red water, an imperfectly-understood complaint, before the cause is suspected. Post-mortem examination of a dead calf may reveal dark red urine in the bladder, or the condition may be detected in the live animal. Affected calves are weak and anaemic, the mouth and lining of the eyelids being pale and bleached. Infection may appear when calves begin eating grass, though sometimes it is evident when they are still on milk alone. The cause is probably faulty feeding.

Grazing should be restricted or the calves put in a barer paddock and the older ones allowed a little hay. Milk should be rationed strictly and limewater and a teaspoonful of salt added to each calf's feed. A dessertspoon of vegetable turpentine in a little oil or milk should be given to affected animals.

Calf Diphtheria

A disease which is not common in New Zealand, calf diphtheria has no connection with the human disease, but is an infection of the mouth and throat by a common dirt germ, *Bacillus necrophorus,* and is more likely to be seen in dirty conditions. There may be some swelling of the throat and difficulty in breathing, which sometimes is accompanied by a loud roaring sound. Examination of the mouth may show ulcers and shreds of dead tissue, and an offensive odour is present.

Affected calves should be isolated to prevent infection. Treatment is difficult, and unless calves are valuable slaughter may be advisable. Drugs of the sulphanilimide type, applied as a powder to affected areas, will give good results. If such a drug is not obtainable, the throat may be sprayed with a weak solution of potassium permanganate or other reliable antiseptic.

Blackleg

So far blackleg in calves has been confined to Taranaki and Auckland Provinces. The causal germ is present in the soil. Calves may be seen lame, but more often are found dead. Just after death there may be a definite gas-distended swelling of muscle tissue of the hindquarter or shoulder region, though general swelling of the body occurs fairly soon.

The disease is a scheduled one under the Stock Act. Preventive vaccination is carried out by Inspectors of Stock in infected areas.

Worm Parasites

Lung worms and stomach worms are largely ill results of permanent pastures. The adults present in the animal's body pass out myriads of eggs, and the young forms which hatch out may remain alive in the pasture and capable of reinfecting calves for many months. Balanced feeding of calves will greatly reduce their susceptibility to parasitic attacks, and frequent changes of paddock will limit the amount of infection picked up.

Lung worm is not common, but outbreaks may occur occasionally even in calves three or four months old. Affected calves have a distressing, persistent cough when they are disturbed. Effective treatment requires veterinary assistance, as drenching is of little value.

Stomach worm is more often serious after the weaning stage in autumn and winter. Calves affected become poor and anaemic and scour. Balanced feeding and frequent changes are important in the treatment, and routine drenching with a reliable remedy such as phenothiazine or bluestone-nicotine will reduce the worm load. With calves which are already debilitated, too much cannot be expected from drenching, which to be effective should be started early on country where worms are a recurring trouble. A bonemeal salt lick should always be available to calves through the autumn and winter.

Ringworm

Ringworm is not an uncommon skin infection. Though unsightly and readily infectious, it does not affect the animal's general health. Its presence is indicated by circular, flat, scaly elevations, which may be from the size of a threepenny piece to that of a half-crown, on the face, ears, or body. Its chief importance lies in the readiness with which it is communicated to the hands or arms of attendants.

Isolated lesions may be treated by a thorough soaking with tincture of iodine. If the lesions are extensive, a 5 per cent. solution of bluestone may be scrubbed in. Hands and arms should be washed thoroughly immediately after an infected animal has been handled.

Lead Poisoning

Access to old paint tins or other sources of lead is sometimes responsible for a number of rather sudden deaths of calves because of lead poisoning.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in August as under:—

Auckland—1YA, on August 24, at 12.35 p.m., "Management of the Sow and Litter," by C. W. Wallace. Supervisor, Waikato District Pig Council.

Napier—2YH, on August 13, at 7.15 p.m., "Carcass Competitions and their Value," by H. Hopkins, Supervisor, Tairawhiti District Pig Council.

Palmerston North—2ZA, on August 20, at 7 p.m., "Where Can You Improve on Last Season's Production?" by L. L. Marsdon, Supervisor, Wellington District Pig Council.

Dunedin—4YA, on August 9, at 7.15 p.m., "The Aim of the Breeder," by N. Macdonald, Supervisor, Otago and Southland District Pig Council.

SEED PRODUCTION IN NEW ZEALAND

Cocksfoot

By G. M. McPHERSON,
Instructor in Agriculture, Ashburton.

IN the earlier part of this century, when the bush in the North Island was being felled, burnt, and surface sown, cocksfoot was probably the most important grass in New Zealand. In those days it was often referred to as the "king of grasses." That role has been taken over by perennial ryegrass, which now tends to take a major place in most permanent pasture mixtures sown on ploughable country, but as a constituent of grasslands pastures cocksfoot still occupies an important position.

Cocksfoot seed.

COCKSFOOT is a constituent of most of New Zealand's dairying pastures, and also finds a place on much of the land devoted to cattle and sheep raising. It is a perennial grass with a fairly wide range of habitat. It will thrive and produce good feed on land appreciably lower in fertility than that demanded by perennial ryegrass, though possibly it shows to best advantage in what might be termed medium-class country, where it is not subjected to the keen competition of perennial ryegrass, such as occurs on the more fertile land. Cocksfoot is a shade-loving grass, and in a very leniently-grazed sward soon tends to become dominant. On the other hand, if subjected to close and continuous grazing, particularly by sheep, cocksfoot is inclined to lose its vitality and is readily replaced by other grasses.

Cocksfoot has a fairly long and conspicuous ligule. The sheath is flattened and the whole plant hairless. The shoot is also flat, which enables it to be distinguished readily from timothy, which has a rolled shoot.

History of Production

As a seed producer cocksfoot has occupied a prominent position in New Zealand agriculture for many years, and the history of its production in the initial stages is linked with Banks Peninsula, where it is probable that the first seed produced in New Zealand was harvested almost a century ago. Here are a few extracts from H. C. Jacobson's book "Tales of Banks Peninsula":—

"Farm life on the peninsula is intimately connected with cocksfoot or orchard grass. There is no doubt that the peninsula soil is especially suited to the production of good cocksfoot seed."

Referring to a particular area, the story goes on: "In the autumn of 1852 the land was ploughed and sown in wheat, and after it was harrowed two ridges were sown in cocksfoot. Then it got one stroke of the harrows to cover it. The seed was obtained from Mr. William Wilson, seed merchant, of Christchurch, who imported it from England. Mr. Wilson said it was the very grass for the rough hills of the peninsula, which has been well proved. The wheat was reaped on the land in January, 1853. In a few weeks all the stubble was hidden with the cocksfoot. In December, 1854, and January, 1855, these patches of cocksfoot were reaped with the hook, and it was like a crop of wheat. It was all tied in sheaves and stacked in small stacks in the old Scotch fashion. At this stage, that is 1855, most of the settlers in Pigeon Bay commenced to get a few heads, and many of them sowed it in their gardens, and that is how it spread. In 1854 my father imported a two horse-power threshing mill from Scotland. It threshed the wheat, oats, barley, and ryegrass splendidly, but when the cocksfoot was tried it did not take out more than half the seed. Most of it was put through twice, but the result was not a success, and we were compelled to go back to the flail. In 1865 and 1866 large orders were coming in for the seed. Up till that time it was all tied in sheaves and stacked in the same way as grain, but in 1867 an area which was very ripe was cut short and laid on the stubble. It threshed out so well that the next season this method became universal. . . .

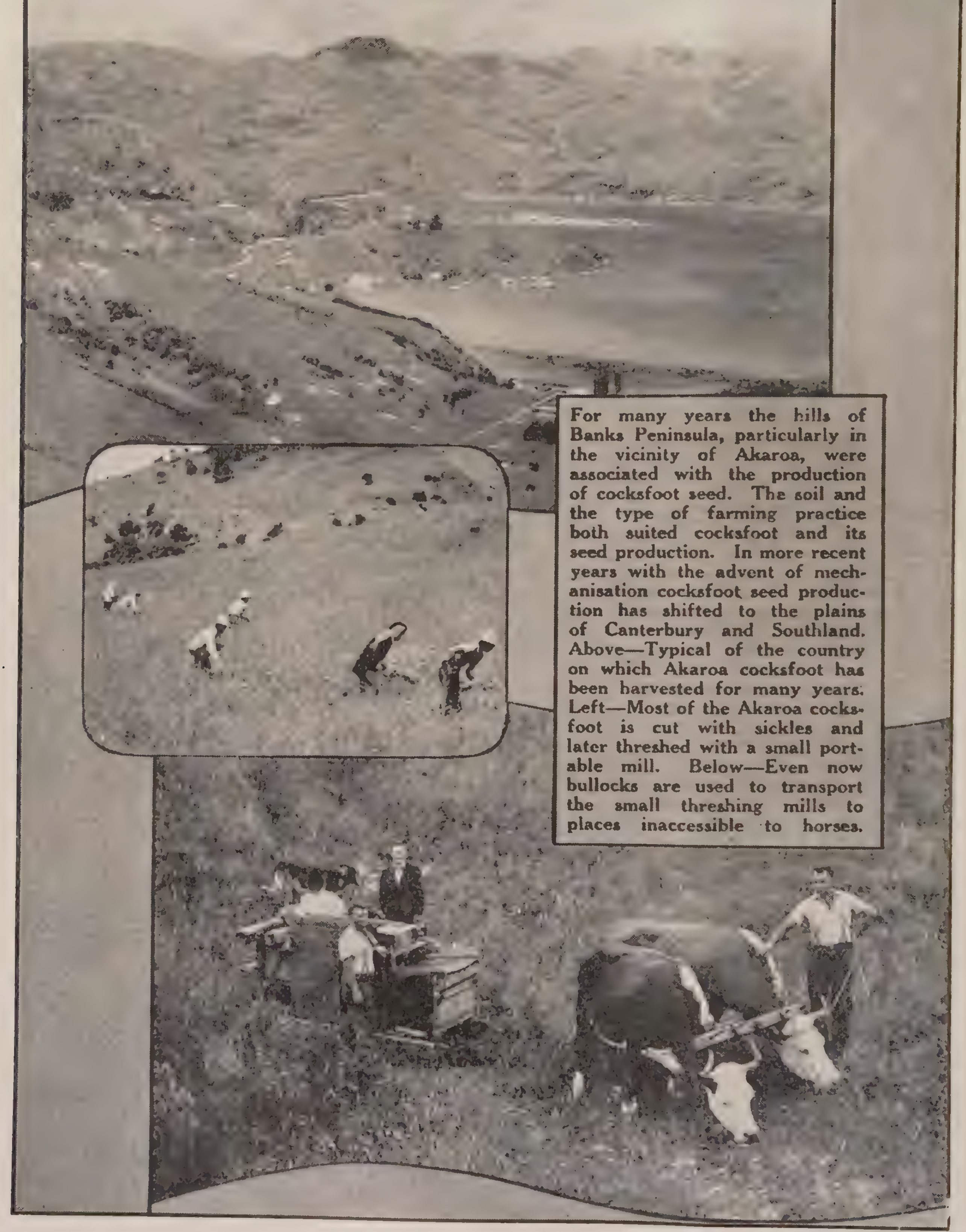
"In 1874 we grew the largest crop we ever cut. We cut over 7000 bushels, allowing 20lb. to the bushel. We commenced to sell at 6d. a pound and we quitted the last at 10d. a pound. I think it averaged about 8d. a pound. Whenever it came below 4d. we gave it up. We found that when it came below 4d. we made more from cattle and sheep. We cut one paddock for 13 years in succession. It got burned and we spelled it for a year, and cut it for six years more, making 19 years in all. We never noticed any difference in the last year's crops. They seemed as good as the first."

Trend to Ashburton and Southland

So started an industry on the peninsula which reached its zenith about the turn of the century. About that time seed

Young cocksfoot pasture.

THE BIRTHPLACE OF THE COCKSFOOT SEED INDUSTRY



For many years the hills of Banks Peninsula, particularly in the vicinity of Akaroa, were associated with the production of cocksfoot seed. The soil and the type of farming practice both suited cocksfoot and its seed production. In more recent years with the advent of mechanisation cocksfoot seed production has shifted to the plains of Canterbury and Southland. Above—Typical of the country on which Akaroa cocksfoot has been harvested for many years. Left—Most of the Akaroa cocksfoot is cut with sickles and later threshed with a small portable mill. Below—Even now bullocks are used to transport the small threshing mills to places inaccessible to horses.

["The New Zealand Farmer" photos.

production reached 100,000 sacks or more annually, with about five sacks of cleaned farmers' dressed seed to the acre. From about 1900 onward the acreage devoted to the production of cocksfoot seed began to decline. This decline was somewhat gradual until 1913-14, when the acreage reserved for seed production fell away very rapidly. The rise in the cost of labour for cutting cocksfoot by hand, the rise in the price of sheep and cow products, the falling off in the demand for seed for sowing bush burns in the North Island, the subdivision of large farms on the peninsula, and the importation of Danish cocksfoot seed were possibly all factors contributing toward the decline. In recent years the area harvested for seed annually on the peninsula has barely reached 2000 acres.

Concurrently with the decline in acreage on the peninsula the area of land devoted to cocksfoot seed production in Ashburton County gradually increased. By 1916 this county was contributing 11 per cent. of the Dominion acreage cut for cocksfoot seed. This percentage steadily increased each year, until in 1931 of a Dominion total of 14,000 acres cut for seed Ashburton County harvested 5000 acres, or 36 per cent. Most of this was grown in the Eiffelton district, which proved eminently suitable for the production of cocksfoot seed. Further, the land being flat, the crop could be harvested mechanically. The method of harvesting was to cut the cocksfoot with the binder, stook it, and then have it mill threshed. The cost of harvesting by this method was considerably less than on the hilly land of the peninsula, where the bulk of the cocksfoot had to be cut with a sickle. Since 1931 Ashburton County has continued to harvest some 3000 to 4000 acres yearly.

The third district to be associated with cocksfoot seed production on an extensive scale was Southland County. There the industry is of comparatively-recent origin, but the expansion in acreage has been much more rapid than in Ashburton County. In 1935-36 the area harvested for cocksfoot seed was 311 acres; seven years later it had increased to 2173 acres, and in the 1945-46 season Southland County was the largest producer of cocksfoot seed in New Zealand.

The following table illustrates the trend in the areas harvested for cocksfoot seed in the three main producing areas during the past 17 years:—

County	1928-29 Acres	1936-37 Acres	1943-44 Acres	1945-46 Acres
Akaroa ..	5768	6821	2008	3022
Ashburton ..	2606	3130	2929	4081
Southland ..	259	459	3376	4579

There has been a very decided decline in the area harvested in Akaroa and a rapid increase in Southland; the figures for Ashburton County show considerable fluctuation with no definite trend in either direction.

Expansion of Production

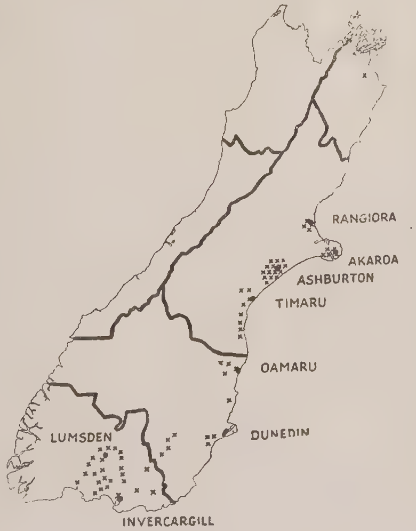
Other districts in New Zealand produce cocksfoot seed, but with the exception of Otago they are of minor importance. The following table shows the area cut for seed in each land district for four seasons:—

	1928-29 Acres	1936-37 Acres	1943-44 Acres	1945-46 Acres
Nth. Auckland	15	37	Nil	4
Auckland ..	56	15	1	5
Gisborne ..	16	48	47	40
Hawke's Bay	43	123	139	134
Taranaki ..	Nil	3	Nil	1
Wellington ..	66	28	63	68
Nelson ..	Nil	1	2	5
Marlborough	50	72	3	123
Westland ..	Nil	Nil	Nil	Nil
Canterbury	10,407	11,714	6,440	10,187
Otago ..	343	473	726	2,682
Southland ..	259	459	3,376	5,692
Totals ..	11,255	12,973	10,797	18,941

Soil Types

Some areas of land in New Zealand have often been referred to as natural cocksfoot country—for example, Banks Peninsula, Otago Peninsula, and parts of Ashburton County. On such land cocksfoot is easily established and a stand readily maintained under suitable management. However, experience suggests that cocksfoot can be grown quite successfully on a wide range of soil types, but the most satisfactory yields of seed are usually obtained from river silts, free-working loams, or peaty soils containing an admixture of clay. Stiff clayey soils which are inclined to crack during dry weather or soils with an ironstone pan do not suit cocksfoot. In other words, the crop demands good drainage and facilities for deep rooting. Good wheat land will usually produce good yields of cocksfoot if the soil has an open texture.

It is doubtful if an attempt should be made to establish cocksfoot for seed on the lighter or drier soil types, as seasonal conditions cause too great a fluctuation in yields. In Southland cocksfoot does well on the alluvial river flats and the silt loam soil type of the easy, undulating country.



The crosses indicate the principal cocksfoot seed-producing areas. Of nearly 19,000 acres cut for seed in 1945-46, little more than 250 acres was in the North Island, mainly in Wellington and Hawke's Bay Provinces.

Place in Rotation

Cocksfoot for seed has no definite place in the rotation of crops, particularly where the land is in good heart. If the land has been reduced in fertility as a result of growing several white crops before it is sown down to cocksfoot, it may be advisable to improve the physical condition of the soil and its fertility with greenfeed crops assisted by suitable fallowing.

Twitches, docks, or Yorkshire fog are very undesirable in a cocksfoot stand, and preparation of the ground should therefore aim at reducing these to a minimum before sowing. Because of the difficulty of separating ryegrass seed from cocksfoot seed during machine dressing, it is also essential to sow cocksfoot for seed production only on land known to contain no ryegrass or only a very slight trace.

Establishment

Usually little difficulty is experienced in obtaining a successful stand on land naturally suited to cocksfoot. In some instances 3 to 4lb. of cocksfoot seed included in an ordinary pasture mixture, with proper management, have resulted in cocksfoot-dominant stands producing very satisfactory seed yields. Where the soil conditions are not so favourable more care has to be exercised if a first-class stand is to be obtained.

There are several ways of establishing a stand for seed production. Particularly in recent years, many stands have been established by sowing cocksfoot seed alone on a fallowed surface. This method has the advantage that a strike is practically assured and, furthermore, if the seed is sown during December or January, there is every prospect of a reasonable crop about 12 months after sowing. When sowing in this manner it is usual to drill the seed through every coulter on a fine and firm seed-bed. Shallow drilling is essential, so coulters with well-worn points should be used. One hundredweight an acre of reverted superphosphate or serpentine superphosphate should be drilled with the seed; in wetter districts straight superphosphate can be used.

Another method frequently used is to sow the cocksfoot in spring in a cover crop, such as wheat, barley, oats, or linseed. The crop is usually drilled in and the cocksfoot seed broadcast at the same time; if cocksfoot is sown with rape, they may both be drilled, the cocksfoot seed being mixed with the fertiliser and sown through the manure box. In districts where annual weed growth is prevalent this method possibly has an advantage over sowing pure cocksfoot in that the cover crop tends to check weed growth to some extent in the initial stages. For stands established in this way cocksfoot seed only may be sown, or 2 to 3lb. an acre of cowgrass seed may be included. If the cocksfoot seed is sown on its own, it is usual to reap a cocksfoot crop about 12 months after harvesting the cover crop. If cowgrass seed is included, the common practice is to take a hay crop, and possibly a seed crop of cowgrass, 12 months after harvesting the cover crop, and then a crop of cocksfoot seed the following year.

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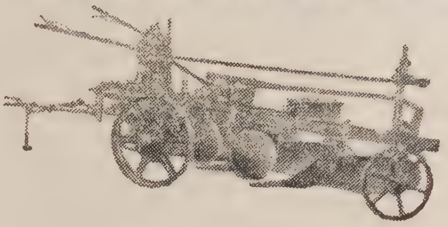

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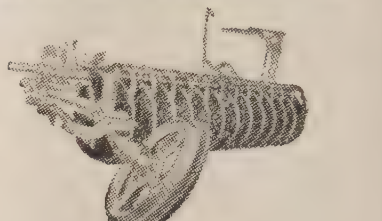

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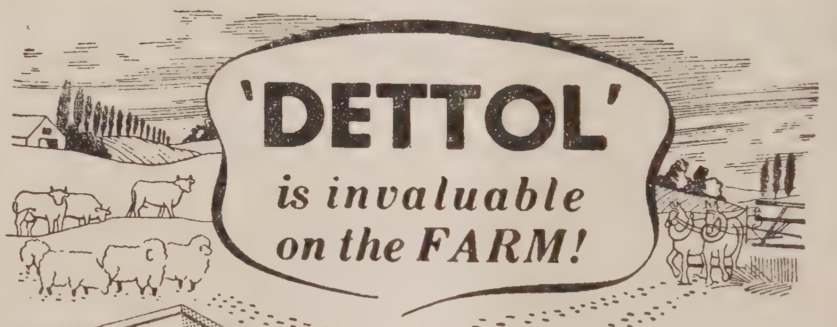

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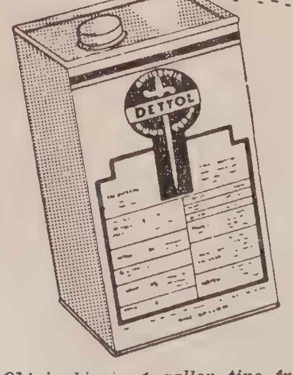

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Overseas experience has indicated that the seed may be drilled in 21in. or 28in. rows to permit of intercultivation of the crop, at least in the early years of the life of the stand. To do this the seed is sown through every third or fourth coulter of the grain drill. This method has not been tried extensively in New Zealand, but it has shown sufficient promise to warrant further areas being sown in this manner. In Otago and Southland successful stands have been established by sowing the seed through the back manure box of a turnip ridger.

It has been suggested that 1 to 2lb. of white clover seed should be included with the cocksfoot to supply nitrogen to the young developing cocksfoot plants and thus tend to promote a more vigorous stand, but there is some doubt about the efficiency of this procedure under all field conditions. On some classes of soil in Canterbury where the practice is adopted white clover tends to dominate the sward during the first year, and a hay crop, or possibly a crop of white clover seed, may be taken at the first harvest. On other soil types the reverse may happen—the young cocksfoot may grow so vigorously that the white clover is almost completely smothered.

Sowing Rates

Opinions vary on the best quantity of cocksfoot seed to sow to establish a suitable stand for seed production. It is generally accepted that the best-yielding stands, and also those which produce the best-quality seed, are those in which the plants are fairly wide apart. Given sufficient room, individual plants develop a robust growth with bold heads, whereas in a thickly-sown stand the plants do not seem to have the same vitality. The difficulty, of course, is to estimate the necessary seeding rate to give the optimum thickness. This will vary with the soil type, the condition of the paddock, and whether the seed is to be drilled or broadcast; the amount of annual weed growth likely to compete with the young cocksfoot is also a factor.

In Ashburton County good cocksfoot stands have been obtained with seedings as low as 5lb. an acre, but the majority of farmers sow 8 to 12lb. an acre, (the larger quantity if the seed is sown broadcast). In Southland the standard quantity is about 6lb. an acre drilled or about 12lb. broadcast; drilling is more usual.

Strains of Seed

In sowing down a paddock for cocksfoot seed production the farmer has the choice of two strains.

The first, and the most widely known, is the Akaroa strain, which takes its name from the district in which it has been grown extensively for almost 100 years. It is understood that the original seed sown on Banks Peninsula was imported from England. Akaroa cocksfoot has a world-wide reputation as a grazing grass. It is not a single type, but rather a combination of varying types. In both Ashburton County and Southland, now the two principal cocksfoot seed-producing areas in the Dominion, Akaroa is the type most widely grown.

The other strain, which has been grown commercially for almost 10 years, is a selection made by Lincoln College from Akaroa cocksfoot. This selection, known as C23, is noted for its high leaf production. It is finer in the leaf and produces a denser sward than Akaroa cocksfoot.

Cocksfoot sown in rows to permit inter-cultivation.

At one time Danish cocksfoot was available to the New Zealand farmer, but none of this seed has been imported in recent years. Danish cocksfoot is inferior to either Akaroa or C23 as a leaf producer, and cannot be recommended for use in this country.

Whatever the strain sown, it is important that the line of seed used be as free as possible from ryegrass seed, or the first step in introducing this impurity into the resultant harvest will have been taken.

Management

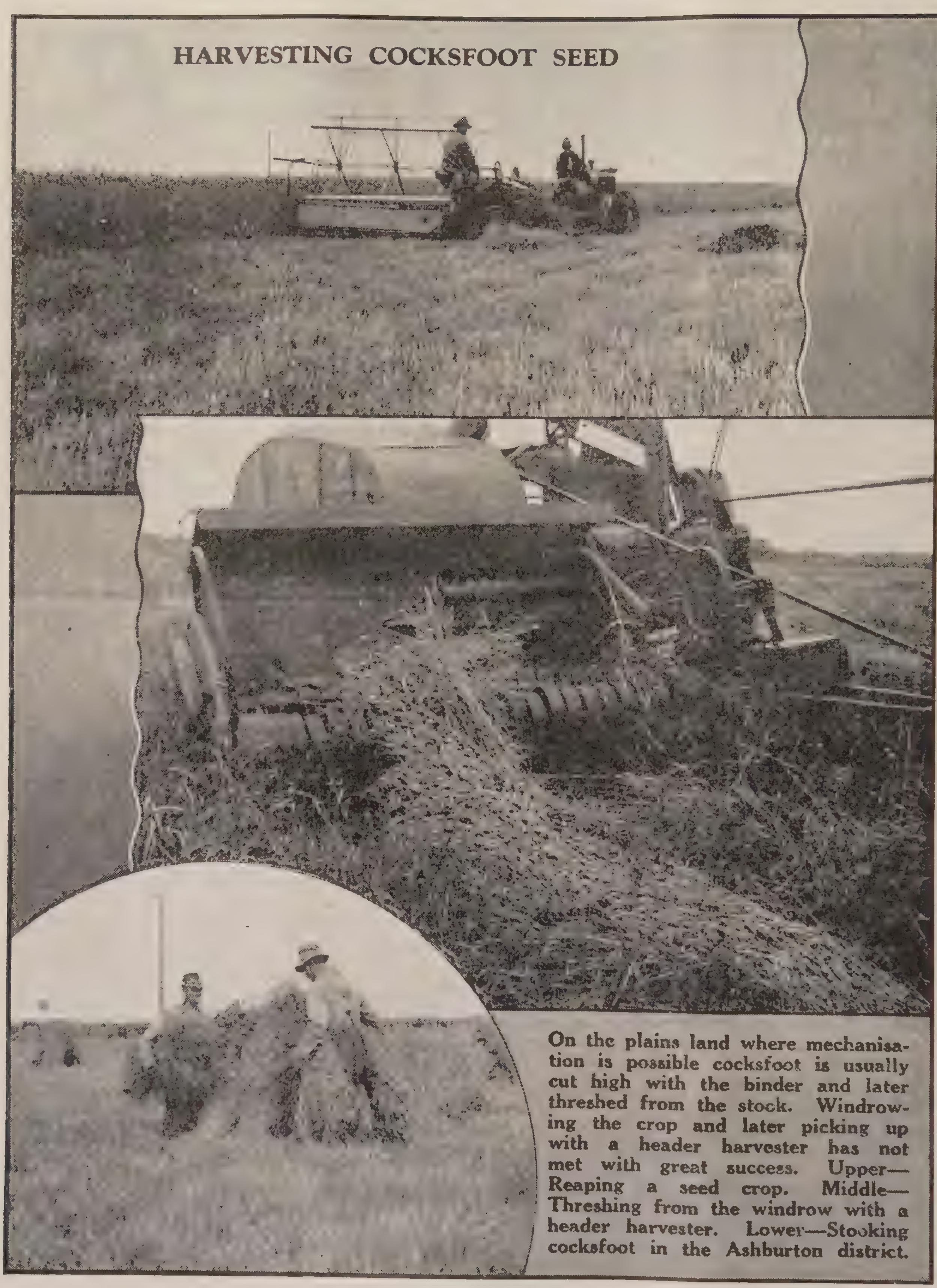
The management of cocksfoot stands for seed production is a subject on which very little reliable information is available. The effect of stocking, burning, or manurial treatments on seed yields and quality is largely a subject of conjecture.

It has been the practice in the past with many seed-producing stands—perhaps most of them—to harvest them for seed and do nothing further with them until the binder is brought in the following year to begin harvesting again. In some cases stands treated in this way have continued to produce profitable yields of seed for 10 to 20 years or more. Over the years such a stand gradually builds up a mass of decaying leafage, which prevents the crown of the cocksfoot, a shade-loving plant, from becoming unduly exposed to direct sunlight. If the dead material is not disturbed, a cocksfoot stand will remain relatively pure for quite a few years.

But while this mass of decaying leafage assists in maintaining a reasonably-pure stand, might it not also have a detrimental effect on the yield and the quality of the seed? That is a question which, in many respects, remains unsolved. It is well known that if a cocksfoot stand is subjected to indiscriminate grazing, particularly by sheep, the plants gradually die out and are replaced by foreign growth. The decline of the industry on Banks Peninsula can be attributed in no small measure to uncontrolled grazing of the cocksfoot seed areas. Though severe grazing of an area is recognised as detrimental to seed production, light and controlled grazing with cattle may have a beneficial effect on both yield and quality of the seed. It is the opinion of many producers of cocksfoot seed that some grazing of stands in autumn is desirable. The stock trample a certain amount of the decaying material into the ground, allowing some sunlight into ground level, and a much more vigorous type of plant results.

The burning of stands to remove a portion of the decaying material has been attempted with indifferent results. In some cases good yields of seed have followed burning, but in other cases the reverse has happened. However, until more is known about the best time of the year and the best condition of the sward for burning, it cannot be recommended as a means of renewing a stand from which the seed yield has ceased to be profitable.

HARVESTING COCKSFOOT SEED



On the plains land where mechanisation is possible cocksfoot is usually cut high with the binder and later threshed from the stock. Windrowing the crop and later picking up with a header harvester has not met with great success. Upper—Reaping a seed crop. Middle—Threshing from the windrow with a header harvester. Lower—Stooking cocksfoot in the Ashburton district.

Topdressing established stands of cocksfoot with sulphate of ammonia has received considerable attention in recent years. Evidence suggests that applications of sulphate of ammonia will increase the seed yield, but in the absence of authoritative data obtained from field trials no definite recommendations can be made about either the quantity or the time of year to apply it. However, some cocksfoot seed producers in both Southland and Canterbury who have applied nitrogenous fertilisers in very early spring claim profitable results. At the present price of sulphate of ammonia and the ruling price for cocksfoot seed, an increase in yield of at least 30lb. an acre ex mill would be necessary to pay expenses, so the ruling value of the seed will determine whether the increased yield from the use of sulphate of ammonia is profitable.

Harvesting

Examination of the kernel probably gives as good an indication as any of when cocksfoot is ready for harvesting. When the majority of the kernels are fully formed, with some of the seed mature, crops may be cut. At this stage seed may be knocked out of some of the riper heads if hit lightly on the hand. The farmer must choose between harvesting good, bright, heavy seed, with the risk of loss of seed by shaking, and the earlier harvesting of light, immature seed which, unless heavily machine dressed, will have a low bushel weight because of the high percentage of seeds containing no kernels or only partially-developed kernels.

Locality largely determines the method by which the seed is harvested. On the hilly country of Banks Peninsula the only practicable way is to reap the cocksfoot with sickles and leave it in bundles on the stubble until it is mature. It is then carted in by hand and threshed on small portable threshing machines in the most convenient positions. In view of the large amount of hand labour involved, harvesting cocksfoot by this means is profitable only when either the yield or the price of the seed is high. Where the contour of the country permits—which applies to practically all cocksfoot areas outside Banks Peninsula—the common practice is to cut the crop with a binder, stook it, and then either thresh from the stook or stack and thresh from the stack. On the flatter land of Canterbury it is usual to thresh cocksfoot from the stook, but in wet seasons it may be necessary to stack the crop before threshing it. In Southland threshing from the stook is common.

To avoid too much leafage in the sheaf the binder is usually set fairly high when cutting the crop. Some farmers place a sack apron under the working parts of the binder to collect any seed threshed out during cutting. In moderately-good weather cocksfoot is usually left in the stook for about a fortnight before being threshed. With a tractor-drawn 8ft. binder about three acres an hour, or 25 to 30 acres a day, can be cut. For threshing the crop either a tin mill or a wooden mill is used, the former now being the more common. Operating a tin mill with a team of seven men, it is usual to thresh about 16 bags an hour in an average crop.

A cocksfoot stand which was burnt in an endeavour to rejuvenate it.

Normally cocksfoot is fairly difficult to thresh, and care must be exercised that good seed is not blown out with the cavings. Conversely, if too high a proportion of cavings is left in the seed, the sample will be poor and the machine dressing loss high.

In recent years a few farmers have windrowed their crops and then threshed them by picking up from the windrow with a header harvester, but results from this method have been indifferent. In good weather it can be quite satisfactory, but if a period of unsettled weather with intermittent rain occurs after windrowing, the loss of seed may be considerable.

Quantity and Quality of Yield

Yields of seed vary widely from season to season. The weather is perhaps the main factor influencing the yield in any year. Lack of sufficient rain at critical periods, dull, showery weather during the time the cocksfoot is in flower, or frosts when the cocksfoot is at or near the flowering stage may all have an adverse effect on yields.

In a normal season a yield approaching 150lb. of machine-dressed seed an acre can be expected, though this figure may vary widely. Individual paddocks in favourable seasons have yielded as high as 600lb. of machine-dressed seed an acre, but yields of less than 20lb. have frequently been obtained when conditions for the growth of the crop have been unfavourable.

The quality of seed also varies from season to season. Usually poor yields are associated with low-quality seed. Apart from the presence of foreign matter, low quality in cocksfoot seed usually implies that a high percentage of the seed has no kernel or only a partially-developed kernel. Seed of this nature has a low bushel weight. On the other hand, seed of which the majority has a fully-formed kernel usually has a high bushel weight and is referred to as good-quality seed.

The machine dressing loss is related to the quality of the field-dressed seed. The object in dressing is not only to remove any foreign seeds but to reduce to a minimum the amount of inert matter, such as stalks and seeds without kernels. Good, bright, heavy seed off the mill or header will have a low machine dressing loss, possibly 25 per cent. or less, whereas the loss in dressing light seed may reach 50 per cent. or more.

Certification

The certification scheme covering cocksfoot applies to both the "natural" strain typified by the cocksfoot originating from Banks Peninsula and the "pedigree" strain (C23) selected by Canterbury Agricultural College. Certification was first carried out by the Department of Agriculture in the 1931-32 season, when all cocksfoot seed areas on Banks Peninsula became eligible for certification, together with areas elsewhere in New Zealand from which a sample of seed had already been tested and had been shown to be of the same strain as that from the Banks Peninsula areas.

The Banks Peninsula growers formed themselves into the Akaroa Cocksfoot Seed Growers' Association to co-operate with the Department in the certification of their produce. Two classes of seed were recognised in the certification scheme, "Mother" seed and "Permanent Pasture" seed.

In 1937 the scheme was amended to identify separately the pedigree (C23)

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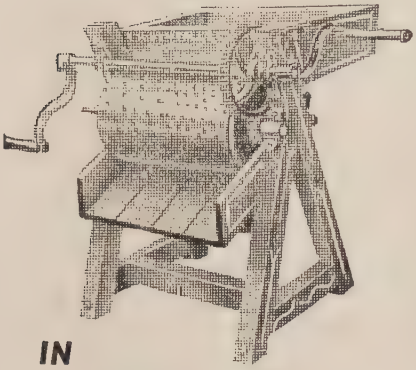

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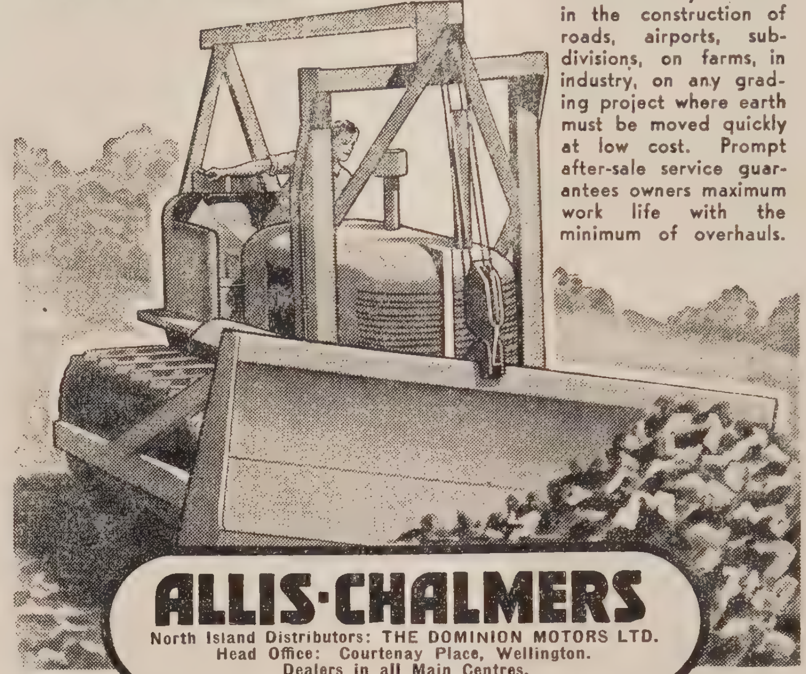

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strain, and two additional higher classes of Certified seed, "Government Stock" and "Pedigree," were introduced. Though subject to the usual certification procedure, areas producing Government Stock seed are under the control of Canterbury Agricultural College, which is also responsible for the distribution of seed certified in this class.

Following are descriptions of the grades of cocksfoot seed in the certification scheme:

Government Stock seed is of the C23 strain, being harvested from areas sown with material selected by the college. Only a trace of ryegrass seed is permitted in machine-dressed seed certified in this class.

Pedigree seed is harvested from areas sown with Certified Government Stock seed, and is thus also all of the C23 strain. The ryegrass content of the machine-dressed seed must not exceed 0.5 per cent.

Mother seed may be harvested from areas sown with Certified Pedigree seed; from all areas on Banks Peninsula where seed is harvested under the certification scheme; or from areas entered for certification in districts other than Banks Peninsula if the stands are five years old or more and a satisfactory type report on seed from a previous harvest has been obtained. To be eligible as Mother seed, the machine-dressed seed must not contain more than 5 per cent. of ryegrass. Mother seed may be of either the C23 strain or the Akaroa strain.

Permanent Pasture seed is harvested from areas under five years old sown with Certified Mother Seed, or from areas on which satisfactory reports on seed from a previous harvest, confirming eligibility as Permanent Pasture, have been obtained. The maximum ryegrass content permissible in the machine-dressed seed is 5 per cent. Permanent Pasture seed may be of either the C23 or the Akaroa strain.

Insects in Cocksfoot Crops

Cocksfoot stands are ideal for harbouring insects, and many different types are found associated with the plants. Only two are considered to be pests, the cocksfoot stem borer and the cocksfoot midge.

Stem Borer

The stem borer, *Glyphipteryx achyloessa*, is usually found about harvest time as a whitish caterpillar in the hollow centre of the cocksfoot seed stalk. The adult stage of this insect is a small, inconspicuous, greyish moth which is on the wing during October and early November. This moth lays its pale-yellow eggs singly on the blades of the cocksfoot and in about three weeks the young caterpillars hatch out.

Immediately after emerging each minute caterpillar crawls down between the sheaths and enters the tender stem of the developing seed head, which at that time is concealed within the closely-wrapped leaf blades. In two or three days the young caterpillar completely encircles the stem, its path being marked by a tunnel, which is later noticeable as a brown mark around the stem above a node.

The result of this injury may be an early whitening of the seed head, resulting in a complete loss or the retarding of growth at any stage between the time the head leaves the shot blade and the harvesting of the crop. However, the majority of heads appear to ripen normally at harvest time.

After making the ring the caterpillar enters the centre of the stem, which is becoming hollow, and moves up this central cavity toward the head. Later, when the head ripens and loses its moisture, the caterpillar, by then more than ¼in. long, moves rapidly down the straw toward the root and bores along the length of the solid, succulent, underground stem. The majority of caterpillars are feeding in the underground stem during February and are fully grown by the end of March. In May and through the winter there is a steady migration of caterpillars ascending the straws before their changing into chrysalides. Not until September and early October is the change to the chrysalid stage completed, and the insects remain in this stage for several weeks before a new season's moths begin to emerge. This moth thus takes 12 months to complete its life cycle.

The occurrence of the stem borer caterpillar in cocksfoot crops varies considerably with the situation and age of the paddocks. Recently-planted areas, except in the vicinity of heavily-infested stands, show only a very low percentage of straws containing the caterpillar. When a few of the younger stands were sampled for three seasons, the infestation was found to increase at the rate of about 10 per cent. a year. The insect appears to build up until an infestation of 35 to 65 per cent. of the straws is reached, and only under conditions very favourable to the insect will the infestation reach 80 to 90 per cent. in any paddock. The loss of seed through white heads occurring in a crop has not been estimated.

Cocksfoot Midge

The cocksfoot midge, *Stenodiplosis geniculata Reuter* var. *dactylidis*, is a tiny dark fly with a red body, which lays its pink eggs in the opening flower of the cocksfoot seed head. The maggots which emerge from these eggs feed on the developing seeds and the later broods live inside the seeds. This fly takes only a few weeks to complete its life cycle.

It was found that 65 to 75 per cent. of the seed from roadside cocksfoot was infested by the midge, whereas machine-dressed seed harvested from paddocks contained about 1 per cent. of damaged seed. This difference is probably the result of the habits of the midge, which overwinters in the uncut seed heads. As on the plains the uncut cocksfoot is mainly confined to the roadsides and fencelines, the midge has to re-infest a cocksfoot paddock each season, whereas the stem borer overwinters within the stand.

Other Insects

Among other insects associated with cocksfoot seed production is a cicada, one of the "insect singers," which abounds in the fields at harvest time.

The female cicada punctures the cocksfoot straw, making a line of jagged holes within which it lays its eggs. The wingless, clawed nymphs which hatch from these eggs live in the ground, feeding at the roots of the cocksfoot.

When cocksfoot is flowering a green plant bug about ¼in. long sucks the sap from the seed heads. A few weeks later a bug of a darker colour is numerous on the ripening heads.

Other injurious insects are the grass-grubs, subterranean caterpillars, and army worms usually found in grass paddocks and a weevil at the base of the stem. Damage may also be caused by mealy bugs and thrips on the seed stalk and by the maggots of a tipulid fly, which are sometimes numerous in the wet surface soil under the cocksfoot flag.

Export of Seed

Each year a considerable quantity of cocksfoot seed is exported. England has always been the principal market for surplus seed, but Australia has taken small quantities at various times. The following table shows the quantity of seed exported annually during the past 10 years:

Year	Quantity Exported (lb.)
1937	121,744
1938	198,242
1939	285,824
1940	434,784
1941	520,800
1942	236,544
1943	435,344
1944	674,576
1945	626,640
1946	642,656

The inability of England to obtain supplies of seed from the Continent during the war probably accounts for the substantial increase in imports from New Zealand from 1940 onward.

Improvement Necessary

The production of cocksfoot seed in New Zealand has been carried on for almost a century, during which time the industry has had its ups and downs, but it has survived. At times the price paid to the grower has returned him a very handsome profit, but on other occasions the farmer has found it exceedingly difficult to dispose of his seed at a price which would even cover the cost of production.

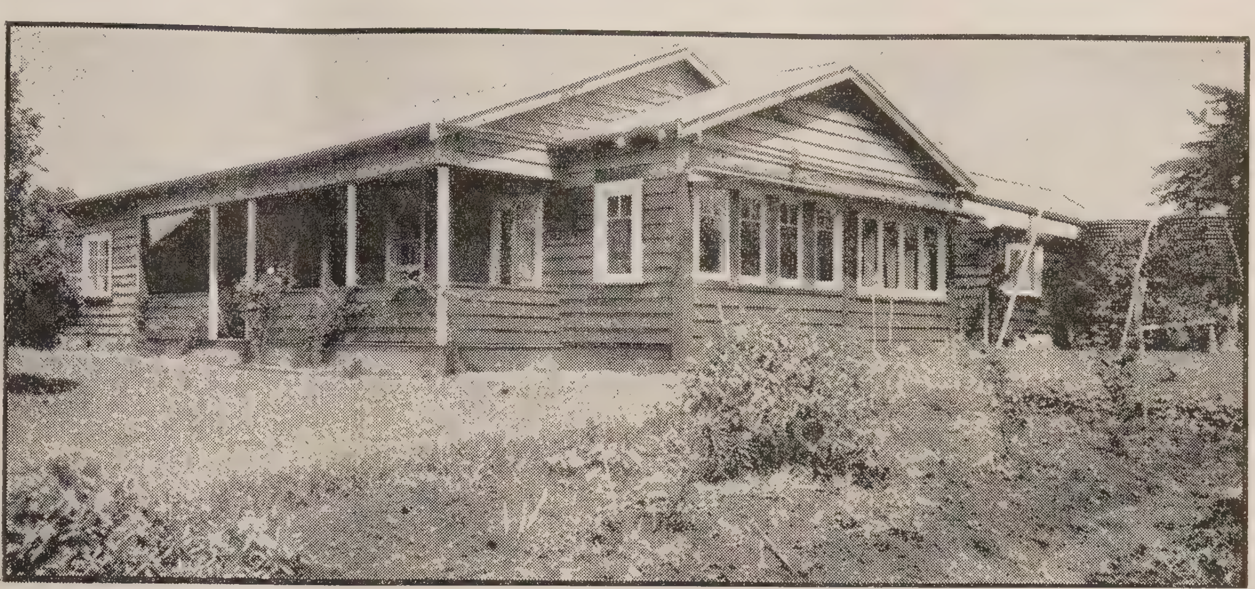
A season of low yields and low prices usually forces many farmers to seek alternative crops as a source of revenue. Under such circumstances usually the poorer-yielding cocksfoot stands are ploughed up and sown down in some other crop, such as wheat, oats, barley, peas, or swedes. With a return to better prices for the seed more cocksfoot stands are again sown down.

If New Zealand is to compete successfully with other countries in the production of cocksfoot seed, steps to improve both the yield and the quality of the seed would appear necessary. There is ample scope for improvement in both.

A KUMEU SMALL HOLDING

Upper left—A hedge of young cryptomeria planted along the road frontage and making excellent progress because of cultivation each side of the row. Upper right—A small tractor is used for cultivating along rows of newly-planted carnations. Centre—The homestead seen from the top flower beds; the area in the foreground has been prepared for more flowers. Lower—Stock grazing in a well-sheltered field.

Developing a Mixed Small Holding



The exterior of the house after the latest alterations. The timber has been treated with creosote and will be allowed to weather before the house is finished uniformly.

TO many people the healthy outdoor life of farming has great appeal, but not all have the necessary finance or the desire to take up large-scale farming. The small holding offers them the opportunity to fulfil a wish for a healthy outdoor occupation without the problems associated with large-scale farming. This story of a mixed farmlet at Kumeu, 25 miles north of Auckland, illustrates what can be done by planning coupled with energy to put the plans into effect. R. G. Hamilton, Horticultural Superintendent, Auckland, describes the farming progress and Eva Topping, Rural Sociologist, Auckland, traces the growth of the homestead from a four-roomed cottage.

THE farmlet, consisting of 25 acres of farmland typical of country just north of Auckland, was acquired as a going concern by the present owners in April, 1944. The area is mainly flat or gently sloping and has from 8 to 12in. of friable loam topsoil overlying the heavy retentive clay typical of the North Auckland soils. The property had been poorly managed for many years and when bought was very neglected, with fences and sheds in varying stages of disrepair, drains blocked, and blackberries gaining a hold.

The farm then carried 10 cows, a Jersey bull, five head of young stock, and 480 fowls. In addition there were 100 lemon trees and 25 apple trees, with a further acre in fruit tree stumps overrun with blackberries. The buildings comprised a cottage of four rooms, a washhouse divided into laundry and a room for a permanent labourer, 22ft. x 14ft. barn with earthen floor, cowshed 26ft. x 14ft., and fowlhouse 150ft. x 16ft. A pumphouse houses an electric motor and pump on a 150ft. bore, with a high-pressure cylinder supplying water to house, sheds, and troughs.

First Year's Work

One of the early tasks in a busy first year was the beginning of alterations to the cottage to provide accommodation for four adults. A garage also had to be built, and as the barn had a 12ft. stud advantage was taken of this height to build a loft floor. All the timber for the alterations and additions was provided from the farm, a number of 35-year-old *Pinus radiata* trees being felled for the purpose.

In the field the acre in old fruit tree stumps and blackberries was cleared, stumps were pulled out, and, with a further two-acre paddock, it was ploughed and cultivated. Half an acre was planted out in flowers — mainly poppies and chrysanthemums — for market, and half an acre in vegetables for the house and greenfeed for the fowls. The balance was put into crops such as maize, oats, carrots, swedes, and soft turnips as supplementary feed for the stock. Ten fruit trees of mixed kinds were planted as the start of a home orchard.

Other activities in the first year included the erection of 100 yards of fencing and the provision of 90 yards of piping for watering the flower beds. A good deal of minor repair work was also necessary. During the first year 400 fowls were kept and 11 cows milked. About 480 day-old chicks were bought and reared for future replacement of the existing flock.

The desire of the owners has been to improve the stock-carrying capacity of the farm with a view to carrying the same number of stock on a smaller area than at present and releasing additional land for flower growing and the culture of sub-tropical fruits. Rapid steps toward that goal have been made during the past two years. House alterations and additions have been completed and two new buildings erected — a lean-to 22ft. x 14ft. against the barn to provide storage for fertilisers, cases, and firewood, and a feed room 28ft. x 16ft. A concrete path of 50 yards was laid between feed room and fowlhouse.

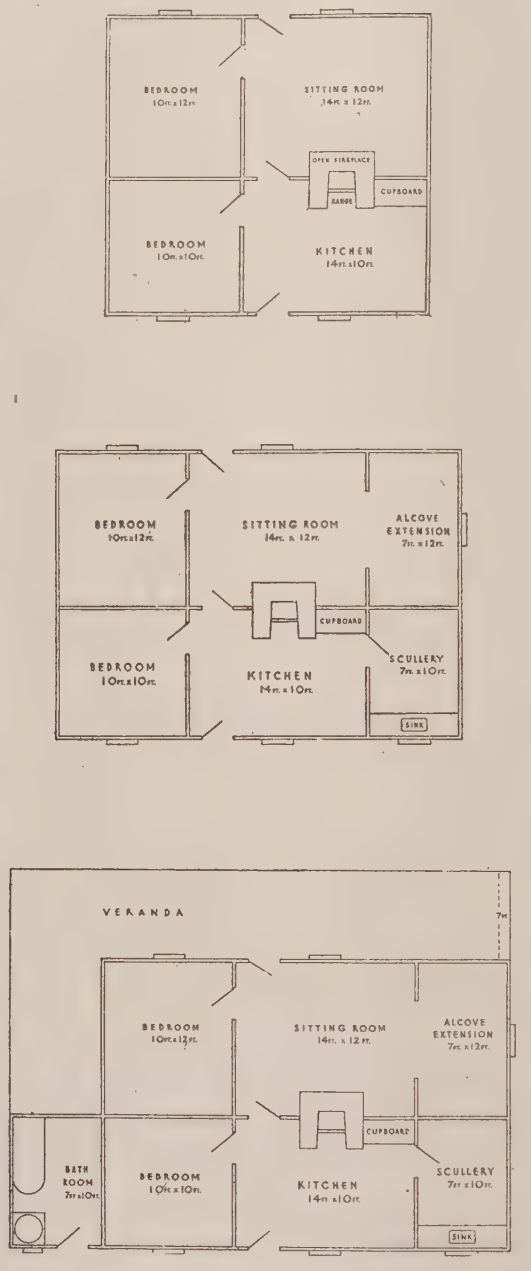
Provision of Shelter

Realising the need for better shelter on the property, the owners have planted about 400 yards of shelter belts. Various kinds of trees have been used, there being a fine young belt of 150 yards of totaras and a 50-yard belt of mixed natives, mainly puriri, rimu, kauri, and tanekaha. There is also a 50-yard belt of oaks, sycamore, chestnut, and walnut, while *Bambusa vulgaris, Cryptomeria elegans*, flowering gums, and silver birch are used to advantage in other belts. Further planting is proposed, and in future years this mixed shelter should add greatly to the beauty of the property. The belts are making rapid growth, largely because of the cultivation given each side of the rows of young trees.

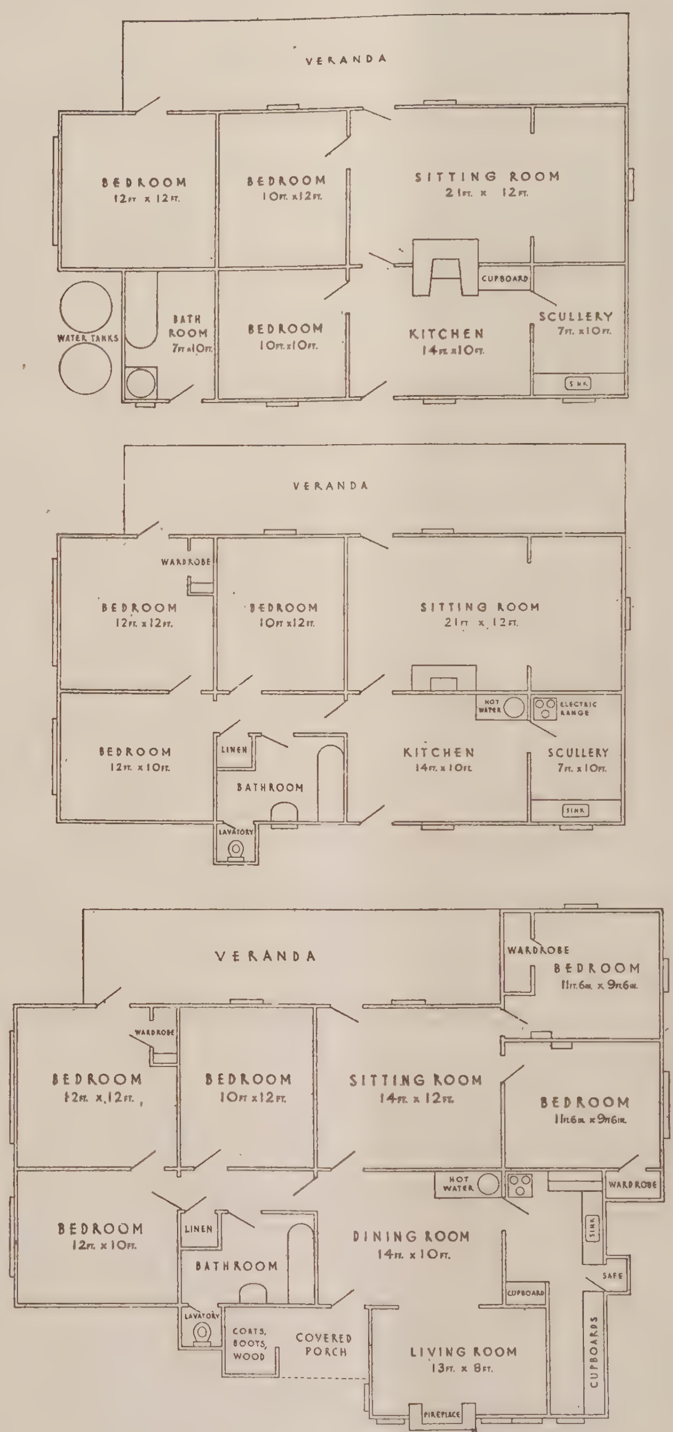
Albizzia lopantha is used as a fast-growing temporary shelter for subdividing the flower beds and will be removed when the permanent shelter

Photographs on this and opposite pages by Sparrow Industrial Pictures Ltd.

HOW THE HOUSE DEVELOPED WITH THE FARM


BEDROOM 10FT. x 12FT.
SITTING ROOM 14FT. x 12FT.
OPEN FIREPLACE
RANGE
CUPBOARD
BEDROOM 10FT. x 10FT.
KITCHEN 14FT. x 10FT.
BEDROOM 10FT. x 12FT.
SITTING ROOM 14FT. x 12FT.
ALCOVE EXTENSION 7FT. x 12FT.
CUPBOARD
SCULLERY 7FT. x 10FT.
BEDROOM 10FT. x 10FT.
KITCHEN 14FT. x 10FT.
SINK
VERANDA
7FT
BEDROOM 10FT. x 12FT.
SITTING ROOM 14FT. x 12FT.
ALCOVE EXTENSION 7FT. x 12FT.
CUPBOARD
SCULLERY 7FT. x 10FT.
BATH ROOM 7FT. x 10FT.
BEDROOM 10FT. x 10FT.
KITCHEN 14FT. x 10FT.
SINK

Upper: The plan of the original cottage. Middle: Scullery added and sitting room extended. Lower: Veranda and bathroom added.


VERANDA
BEDROOM 12FT. x 12FT.
BEDROOM 10FT. x 12FT.
SITTING ROOM 21FT. x 12FT.
CUPBOARD
SCULLERY 7FT. x 10FT.
WATER TANKS
BATH ROOM 7FT. x 10FT.
BEDROOM 10FT. x 10FT.
KITCHEN 14FT. x 10FT.
SINK
VERANDA
WARDROBE
BEDROOM 12FT. x 12FT.
BEDROOM 10FT. x 12FT.
SITTING ROOM 21FT. x 12FT.
HOT WATER
ELECTRIC RANGE
BEDROOM 12FT. x 10FT.
LINEN
BATHROOM
LAVATORY
KITCHEN 14FT. x 10FT.
SCULLERY 7FT. x 10FT.
SINK
VERANDA
WARDROBE
BEDROOM 11FT. 6IN. x 9FT. 6IN.
WARDROBE
BEDROOM 12FT. x 12FT.
BEDROOM 10FT. x 12FT.
SITTING ROOM 14FT. x 12FT.
BEDROOM 11FT. 6IN. x 9FT. 6IN.
HOT WATER
WARDROBE
BEDROOM 12FT. x 10FT.
LINEN
BATHROOM
DINING ROOM 14FT. x 10FT.
SINK
SAFE
CUPBOARD
LAVATORY
COATS, BOOTS, WOOD
COVERED PORCH
LIVING ROOM 13FT. x 8FT.
FIREPLACE
CUPBOARDS

Upper: The plan in 1944, when the present owners took over. Middle: The first alterations made by the present owners. Lower: The alterations completed last year.

[*Sparrow Industrial Pictures Ltd. photo.*

The area in the foreground is being prepared for carnations. Temporary shelter is given by the young *Albizzia lopantha* hedge on the right. The cowshed and feed barn are on the left.

has attained sufficient height. Ninety feijoas planted as a hedge will provide shelter for the area in flowers and fruit for market.

The block of lemons was found uneconomic because of the ravages of borer and, with blackberry gaining a hold, it was decided to pull out all but 10 trees and put the area into crops for the stock. Planting of sub-tropical fruits has begun and so far they include 15 Wheeny grapefruit, 20 Chinese gooseberries, 18 persimmons, and 15 loquats. More planting is scheduled for the near future, including a quarter of an acre of passion fruit.

A feature of interest is the use of the electric fence. About 1500 yards of this fence—some two-wire, but mainly one-wire—has been erected for protection of the newly-planted shelter belts and for the provision of races across paddocks for the movement of stock. The electric fence provides satisfactory yet relatively-cheap protection for the shelter from stock.

An appreciable quantity of fowl feed is now produced on the farm, and the recent planting of half an acre of lucerne and half an acre of pampas grass should provide valuable supplementary feed for the stock. The raising of 200 to 300 chickens and three or four heifer calves each year allows a sound policy of stock replacement which should materially improve the annual returns.

Compost, Green Crops, Sawdust

A mixed farm such as this offers excellent opportunities for the making of compost, and during the past three years about 10 tons has been made annually. In addition to the liberal use of compost, soil improvement is furthered by the growing and turning under of green crops, such as blue lupins, between crops of vegetables and flowers. As soon as a crop is out lupins are sown, and though they may not reach maturity before the ground is required for further cropping, a valuable green crop is produced.

Serving a double purpose, sawdust is spread in the cowyard and the litter is used later to mulch the flowers; as well as keeping the yard clean, the manure-impregnated sawdust assists greatly in the production of flowers. Certain manures, such as basic slag and fish manure, have also been used for improving the fertility of the soil.

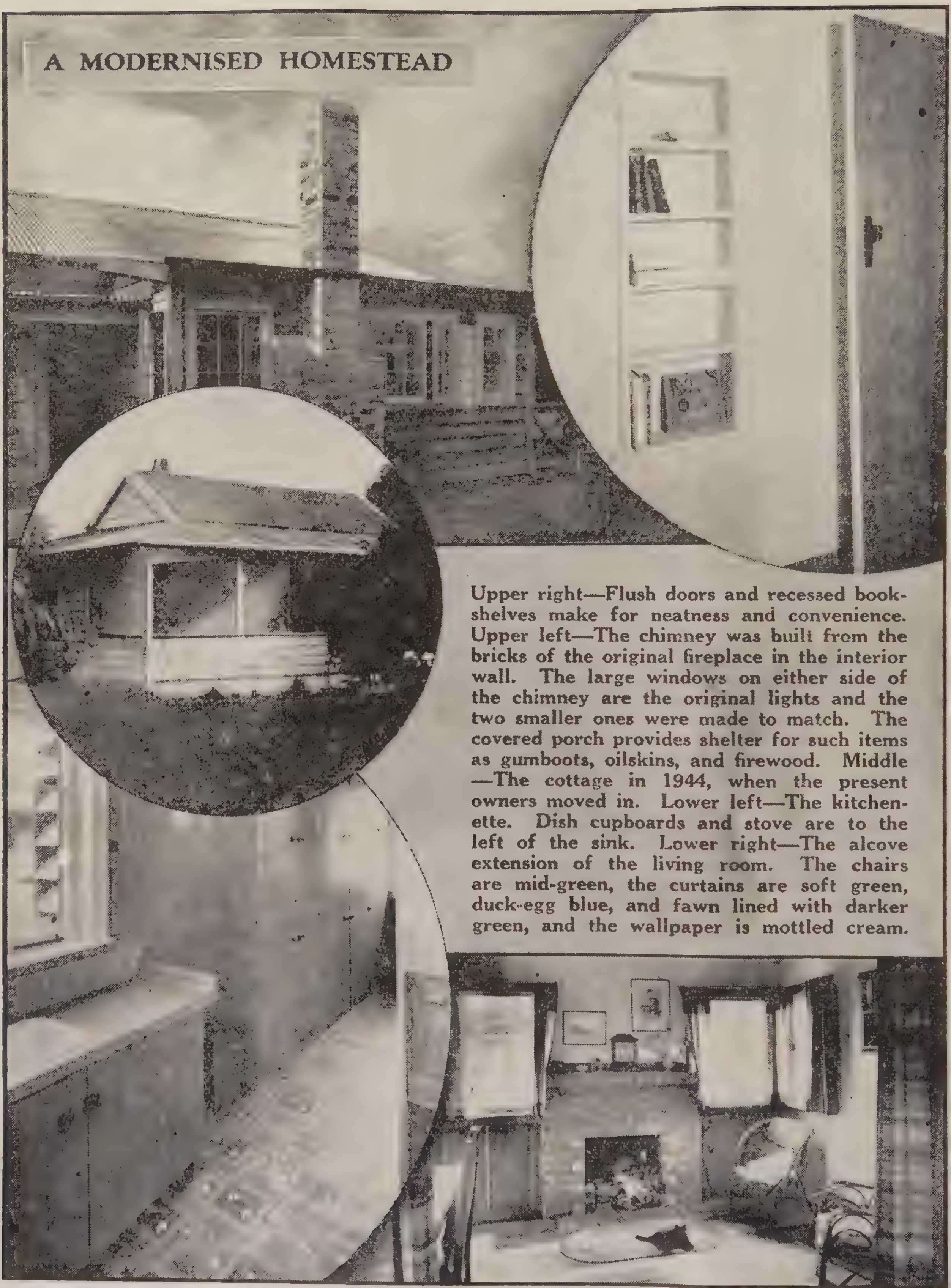
During the past two years the increasing amount of work has necessitated the employment of additional labour, and a man and a girl have been employed practically constantly for the past 18 months.

Despite the reduction in the numbers of cows and fowls, production from those sources has shown a steady increase, and when further revenue is derived from expansion of the area in flowers and the newly-planted fruits a very efficient and productive unit will have been established. At present this farmlet, which supports three partners in the venture and two additional employees, is more than paying its way—a fine tribute to the energy and resourcefulness of the owners.

[*Sparrow Industrial Pictures Ltd. photo.*

A general view of the farm paddocks, photographed from the same place as the upper illustration but looking further left.

A MODERNISED HOMESTEAD



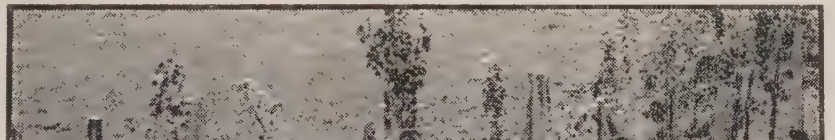
Upper right—Flush doors and recessed bookshelves make for neatness and convenience. Upper left—The chimney was built from the bricks of the original fireplace in the interior wall. The large windows on either side of the chimney are the original lights and the two smaller ones were made to match. The covered porch provides shelter for such items as gumboots, oilskins, and firewood. Middle—The cottage in 1944, when the present owners moved in. Lower left—The kitchenette. Dish cupboards and stove are to the left of the sink. Lower right—The alcove extension of the living room. The chairs are mid-green, the curtains are soft green, duck-egg blue, and fawn lined with darker green, and the wallpaper is mottled cream.

The feed room and fowlhouses, well sheltered from southerly winds.

Development of Homestead

The home originally built on the property was a small cottage 24ft. x 22ft. erected about 32 years ago. It had four rooms—two bedrooms, a sitting room, and a kitchen-living room, all inter-communicating. There were no veranda, porch, entrance lobby, or other embellishments; it was just a square cottage with a gable roof. The chimney was in the dividing wall and served both the kitchen range and the open fireplace in the sitting room. A detached building consisting of washhouse and farm worker's room is behind the house. Through the years the cottage has been altered at various times until now there is a roomy, comfortable house of five bedrooms, living room, sitting room, kitchenette, and bathroom, with a wide veranda along the sunny side.

The first alterations were made by the original owner, who built a veranda on the north and west sides and extended the sitting room and kitchen. The veranda was 7ft. wide and had a low weatherboard wall on the outside. The extension to the sitting room formed an alcove at the east end 7ft. wide and the full width of the room, with a window in the centre of the new exterior wall. This extension on the east side of the cottage was continued to form a scullery alongside the kitchen. A sink and window were built in at the south end and a door opened from the kitchen. Those alterations must have improved the exterior appearance of the cottage considerably, and the addition of a scullery would have made the kitchen much more convenient. Later 10ft. of the veranda was enclosed to make a bathroom, which also housed the hot water cylinder. However, there was no access to the bathroom from inside the house; it had to be approached from outdoors—a little trying, no doubt, on a cold, wet, windy night.



Upper—The old method of protecting young hedges from stock: Five barbed wires. Lower—The new method: The electric fence, using only one barbed wire.

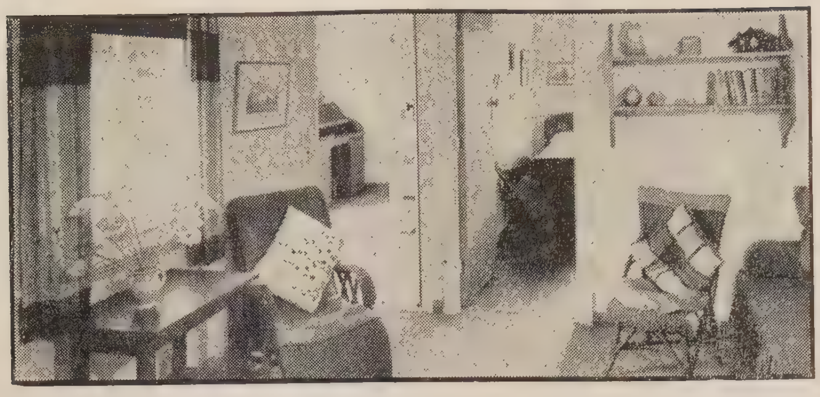
By that time either the owner's family had increased or they needed a guest room, for the next building activities provided a third and larger bedroom on the west side. The veranda floor was extended outward for a further 5ft. and the front exterior wall lengthened to correspond, giving a floor space of 12ft. x 12ft. to the new bedroom. A glass door opening on to the veranda, one casement window on the north side, and four similar windows on the west made this a light and airy room.

New Owners' Work

This was the stage the house had reached when the present owners came to the property in 1944. They found the bathroom inconvenient and soon decided to convert the smaller back bedroom into a bathroom and passageway, and to enlarge the existing bathroom to make a bedroom 10ft. x 12ft. The provision of a passage enabled the bedroom doors to be arranged so that access from each bedroom to the bathroom would be more direct. The doorway of the bedroom in the front of the house, which opened into the sitting room, was boarded up and a new one made in the wall adjoining the passage. A roomy linen cupboard was

Photographs on this and opposite pages by Sparrow Industrial Pictures Ltd.

MODERNISING THE HOUSE



[*Sparrow Industrial Pictures Ltd. photo.*

The two new bedrooms open off the sitting room.

constructed, jutting into the new bathroom, with the door opening into the passage. The owners also installed a septic drainage system, with a lavatory situated by the bathroom but separated from it by a door. The hot-water cylinder, formerly in the old bathroom, was moved into a cupboard in the kitchen.

As members of the household are much occupied in the flower gardens and on the farm, storage space for working boots and coats was essential. A wide area of concrete was laid at the back door and a porch built large enough to accommodate work clothes and to store firewood. A door was unnecessary, as it would impede access and the open end of the porch was well protected from bad weather.

At various times ways of improving the house still further were discussed by the owners, and in March of last year the latest alterations were begun. Perhaps that is not quite correct, for the work really started when eight large *Pinus radiata* trees, 35 years old, were felled on the property. They were sent to the local mill and sawn into suitable-sized timber for the new building operations.

An extension 8ft. wide was added to the back wall of the former kitchen and scullery. Part of this addition now makes a pleasant sitting room alcove and the original kitchen has become the dining room area. The sink and window at the back wall of the scullery have been moved to the east wall and the new space is fitted with one complete wall of store cupboards reaching from floor to ceiling. The former alcove in the sitting room has been absorbed in the extension on the north-east corner, giving two extra bedrooms each 9ft. 6in. x 11ft. 6in. The doors to these bedrooms both open into the sitting room, which is now a large entrance-hall-cum-sitting-room—a most attractive and pleasant feature of the front of the house. The fireplace in this room has been removed and the bricks from the chimney were salvaged to build a new one on the outside wall at the back of the house. Some of the bricks were blackened by soot, some coated in red ochre from the hearth, and some are the original buff colour well mellowed by time; carefully selected for effect, these varying soft tones make the new chimney very pleasing to the eye.

In keeping with the outdoor occupations, the new building has been planned to simplify housekeeping. That is especially noticeable in the kitchenette.

The terrazzo sink bench set under a double casement window has the space beneath divided into three cupboards: To the right cleaning materials are stored, in the centre is the tin for refuse, and to the left are saucepans and oven utensils. There are two drawers also to the left, one for cutlery and one for kitchen knives and similar cooking gear. Above the sink, on the dividing wall to the left, is a shallow crockery cupboard with a bench beneath the same height as the sink top.

The electric stove is to the left of the crockery cupboard and a small work table stands by the wall opposite the sink. At the left of the table are two tiers of small bins for cereals, flour, sugar, and other foods, with shallow cupboards above for other commodities of every-day use. A rail above the table keeps oven cloths and tea towels within hand's reach from sink or stove. The safe on the outside wall at the right of the sink is divided into two compartments so that milk, butter, eggs, and other foodstuffs frequently required can be withdrawn without the upper part in which the meat is stored being opened. The cupboards in the new part of the kitchenette are kept for reserve stocks of groceries, bottled fruit and tomatoes, jams, and preserves. Large quantities of home-grown fruits are preserved in season and the extra storage cupboards have already proved a great success.

Walls and cupboards have been finished in a light shade of green enamel, a surface which is quickly cleaned and though light in effect does not show fingerprints and other marks quite as readily as cream paint. The ceiling is painted pale grey, the floor covering is linoleum, and the sink bench is green and buff terrazzo. The table top and the bench under the crockery cupboard are covered with linoleum.

The New Living Room

Both the planning and the decoration of the new living room presented problems. With the room on the least sunny side of the house, light and sun had to be caught by a careful arrangement of windows. The old kitchen windows, with others made to match, fill the space on either side of the fireplace and, to catch the afternoon sun, extend round the west corner. With the floor plan which has been described, it was difficult to devise a scheme of decoration which would make a feature of the stubborn division of the room rather than an unsuccessful attempt to disguise it. The two-fold design is matched by the two-fold purpose of dining room and sitting room. Handy to the kitchen, the inner part simply becomes the dining room, and the alcove, out of the line of traffic and draught from the back door, serves as a living room. Striped curtains frame the alcove attractively and give it an air of intimate and comfortable seclusion. The colours in these curtains echo the shades used in both parts of the room and, with cream walls and oiled floor, give the necessary unity.

Protection of the light wallpaper, specially chosen as a good background for a collection of water colours, but possibly not over-serviceable in a much-used room, was secured by three-ply wood panelling around the fireside. The hearth bricks are set in at floor level so that dust from the room can be swept straight into the ashpit. It was decided that an oiled and polished floor would be the most easily kept, so to prepare for this, and to make the join between old and new boards less noticeable, they were treated with a sanding machine. Brown and green matting laid where there is most treading is a happy choice; it is practical and it looks well. Storage for books, pieces of pottery, and china has been provided by setting shelves into the end walls, a scheme which saves floor space and is decorative.

The furnishings in the three living rooms are carried through in one colour scheme, so giving an impression of space. This uniformity of colouring is an advantage when extra seating is required in any room, as borrowed chairs and cushions accord happily with those already in place.

Bedroom Fittings

Shelved wall niches are repeated in the new bedrooms for books, work boxes, and other personal oddments. Wardrobes are built in and arranged conveniently with shelves for shoes and hats in addition to generous hanging space. Above each wardrobe is a cupboard which will house suitcases, extra blankets, and other bulky, less frequently-used chattels.

One of the owners has moved into the bedroom at the front of the house and the other room is kept for visitors. Since the alterations were completed the guest room has been much used, and the ability to offer hospitality without upsetting the normal arrangement of the house has been a source of great pleasure and satisfaction.

The latest alterations are finished, the redecorating done, and the original outlines of the cottage are lost in the present-day appearance of the farm house, but the owners already have ideas for still further improving the home.

A Study of Machine Milking Technique

By R. H. ELLIS, *Consulting Officer, New Zealand Dairy Board, and* W. G. WHITTLESTON, *Physical Chemist, Animal Research Station, Ruakura.*

USING field testing methods for the examination of milking machines described in the "Journal" for November, 1946, a study has been made of the machines and methods of 33 North Auckland dairy farmers. This study has enabled further trying of the suggested testing methods and has extended data on conditions in New Zealand milking sheds.

THE test equipment used consisted of a weighted gauge tester, a gauge calibrated in air flow through a ¼in. orifice as well as in vacuum, a revolution counter, and a watch. The tests carried out were for pulsator rate, accuracy of vacuum gauge, condition of relief valve, air displacement, and speed of pump. The results are set out for each of the main components of the machine.

Type of Machine

Five of the machines had single pipelines—that is, the milk line served to supply the vacuum for the pulsators. Only one machine had a low-level milk pipe, five had vacuum breaks (a valve causing an intermittent shut-off between the teat cups and the milk line), and 13 machines were "doubled up," each double bail having two sets of cups instead of the normal one set.

Pulsators

Only two of the machines had rotary pulsators, the remainder being of the slide-valve type. Pulsator speeds ranged between 28 and 64 pulsations a minute, the average being 42.4. Eight pulsators worked at 40 pulsations a minute, five at 42, five at 46, and three at 38. As no differences in milking efficiency could be detected between machines working at different pulsator rates, it is evident that the rate is not important. That confirms the result of experimental work at Ruakura.

Relief Valves

Twenty-three of the relief valves were of the spring-loaded poppet type, three of which had covered springs; nine of the valves were of the ball type, and one was not recorded. Nine of the valves were not working or working unsatisfactorily, four of the faulty valves being of the ball type. That is much better than has been recorded in previous surveys, which have shown as many as half of the relief valves in some areas to be faulty.

The continued use of ball valves is unfortunate, as this type is very inefficient. It is to be regretted that a weighted valve is not readily available commercially, as this type is the most reliable and sensitive of all tested so far.

Vacuum Gauges and Pumps

Two of the machines had dual vacuum systems fitted with two gauges, and in such cases only the milk-line gauge is considered. Of the 33 gauges tested, 20 were out by 1in. or more and only 39 per cent. were accurate. The following figures summarise the errors:—

Error (in.)	Number
+ 1	4
— 1	9
— 1½	1
— 2	2
+ 3	2
— 3	1
— 4	1

The high proportion of gauges reading low—that is, showing a vacuum lower than that actually in the machine—is disconcerting in view of the damage high vacuum may cause on a badly-operated milking machine.

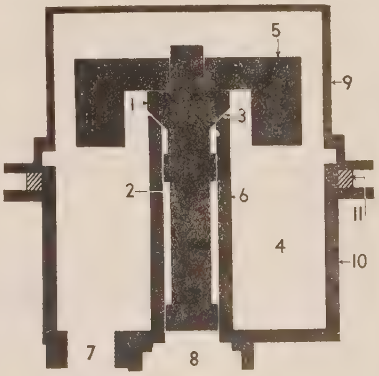
The need for a gauge-testing service is at once apparent, but the authors are of the opinion that in the long run the use of an accurately-adjusted weighted relief valve which remains fixed at a blow-off vacuum between 14 and 15in. of mercury is the farmer's best protection against high vacuum. The present situation is very unsatisfactory and steps should be taken immediately to have gauges tested. Methods of testing and portable test equipment have been described in the "Journal" and in Bulletin 260, "Mechanical Milking," obtainable free from any office of the Department of Agriculture.

One of the vacuum pumps tested was of the piston type, one a rubber diaphragm type actually handling the milk, and all of the remainder were two-vane rotary types. Air displacements were estimated with the pulsators running, giving a figure indicating the actual displacement available for the milking process. Dividing by the number of teat cups in use gives a figure of merit for the displacement power of the vacuum pump on a machine of any size. A figure of .06 cu.ft/sec./set of cups is regarded as the minimum figure, and a North Canterbury survey gave an average of .059 for 20 machines, only three of which were doubled up. The present survey gave an over-all average of .053 cu.ft./sec./set of cups; the single-bail plants averaged .062, and the double plants .040. In the past the practical requirements of the double plant per set of cups has been estimated at two-thirds of that of the single-bail plant—that is, a four-cow double plant is treated as a single six and a six as a nine in estimating pump capacity. The machines in this survey agree almost exactly with that estimate.

In the light of present knowledge the figure of .06 for single and .04 for double plants is regarded as a minimum. Seven of the double plants out of 13 were below .04 and 11 of 19 single plants were below .06. It would appear that there is a need for a reduction in leaks and an increase in pump efficiency or pump speed on many milking machines.

Inflations

Two machines were completely fitted with moulded inflations, one machine had half of the teat cups so fitted, and one machine had light moulded inflations throughout. The average life of the soft inflations was 6.4 weeks; 16 farmers changed their inflations at four- to six-week intervals, one changed his every three weeks, eight changed them every eight weeks, and two used them for 12 weeks. The moulded inflation users changed at 12- and 24-week periods, and the user



The construction of a weighted relief valve, the most reliable and sensitive of all tested so far. The valve (1), which is integral with the guide portion (2), rests on its seat (3) in the main chamber of the device (4), the valve being held closed by its own weight and that of the weight (5). The motion of the valve is guided by the portion 2, which maintains the valve centrally in the tube (6), in the upper end of which the seat is formed. The valve is attached to the machine by a threaded boss (7), and air passes in through the opening 8. The main chamber is divided into two sections (9 and 10), the upper being readily removable and making an air-tight fit with the lower section by means of a rubber ring (11), the two parts being held together by three small bolts. The weight is thus removable and may be changed by opening the valve chamber.

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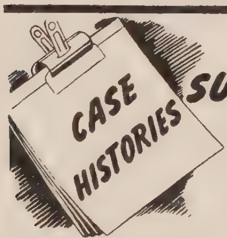

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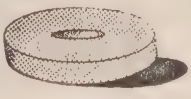

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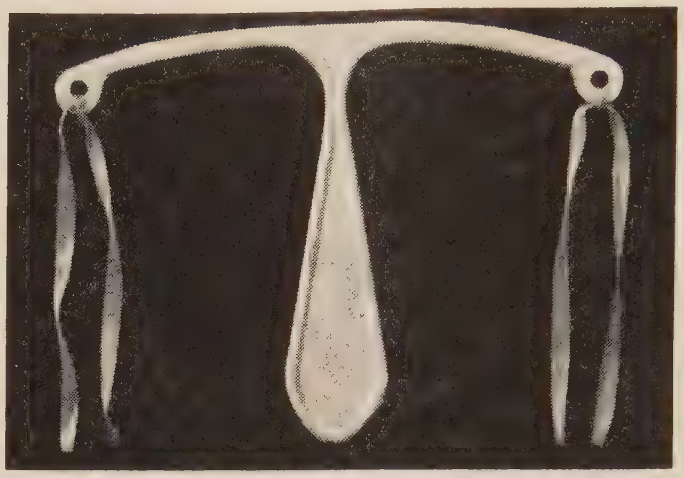

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of light moulded inflations used two sets a season.

It is apparent that the recommended period of six weeks is exceeded by a high percentage of farmers. The authors are of the opinion that, unless soft inflations are periodically removed from the teat cups and boiled up in a 5 per cent. caustic soda solution to remove the butterfat and bacterial contamination, they should be changed at six weeks when up to 15 cows/set of cups/milking are handled and more frequently when more cows are milked.

Further, it is strongly recommended that when possible boiling water and caustic soda be used twice a day for cleaning, as only thus can inflations and tubing be kept in good hygienic condition.

Cleaning Methods

Cleaning methods were noted in the cases of 19 farmers, of whom 17 used caustic soda once daily, one used hot water alone, and one used caustic soda once in four milkings. It is apparent that the standard of cleaning technique is poor, though those figures reflect war-caused shortages. However, in normal times there is a widespread unwillingness on the part of dairy farmers to clean machines properly twice a day. In view of the recent knowledge about the contamination of dairy equipment with mastitis-causing organisms and the need for strict hygiene in the shed, that is most unfortunate. The production of good-quality cream and milk, the maintenance of rubberware and milk tubing in good order for long periods, and reduction in the spread of mastitis organisms all depend on good hygiene.

Incidence of "Gadgets"

The sight glass is regarded as the only "gadget" serving any useful purpose. In fact, the sight glass should not be regarded as a "gadget" but as part of the complete machine. Glass "interceptors" low in the bail are justified only because they act as sight glasses—they have no other useful function. The incidence of "gadgets" was as follows:—

Sight glasses on milk pipe ..	8
Interceptors low in bail ..	7
Pulsator choking units ..	1
No gadgets	17

It is apparent that the incidence of useless "gadgets" is declining, but there is a need for more sight glasses. A good sight glass up on the milk pipe where it can be seen from all over the shed is essential to a fast milking programme. There is a tendency for cups to be left on too long, which is inefficient and can be avoided only if a sight glass is used.

Speed of Milking

Information on speed of milking was obtained from only 12 farmers. Six had doubled-up plants and averaged 6.9 cows/hour/set of cups; the remaining single-bail plants averaged 8.2 cows/hour/set of cups. In the North Canterbury survey, where all but three of the 20 plants examined were single, the average milking speed was 8.4 cows/hour/set of cups, a very close agreement.

The figure of 6.9 cows/hour/set of cups for doubled-up plants is better than previously recorded. Earlier surveys have shown average rates as low as 5.0 for such plants. The faster rate may reflect the decline in "stripping" devices which cluttered up many of the doubled-up plants tested in earlier surveys.

Size of Herds and Staffs

In 14 cases data as follow were collected on both herd size and number of men in the shed. Unfortunately these cannot be correlated with milking speed, as the data do not coincide.

Number of cows ..	45	58	46	50	42	30	100	108	43	48	60	72	33	44
Number of men ..	1	2	2	2	2	1	2	5	2	1	2	1-2	1	2
Stripping	NS	NS	S	S	S	*	NS	S	S	S	NS	S	NS	DS

NS non-stripping, S strips, DS double strips, * strips only until mid-January.

The average herd size is 55.6 cows milked by 1.9 men—28.9 cows a man.

Shed Technique

The table at the foot of this page summarises the shed methods of the group. It indicates that there is no agreement among farmers about the correct way to milk a cow. The following summary of the observations for which adequate records exist gives a clearer picture of the situation: Fifteen of the farmers are non-strippers, 13 use a teat-cup pulling technique ("machine stripping"), and six definitely do not use leg-ropes. Only eight take a squirt of milk to check on the mastitis position. Only three were noted as using disinfectant in the wash water.

The figures show an increase in the number of non-hand-stripping farmers, which is in line with progressive dairy farm practice. However, it is unfortunate to find that so few take a check squirt of milk. The importance of this procedure would appear to be greater than had been thought previously, as recent experiments point to the importance of a stimulating start to the milking process as the best way to keep up speed and reduce strippings. Taking a squirt after a vigorous washing seems as good a way of stimulating the cow as any. In addition, the wise farmer must keep a day-to-day check on mastitis in his herd.

Trends Shown by Survey

This survey of equipment and methods in the North Auckland area shows certain trends compared with earlier surveys.

There appear to be more relief valves in use which actually work, though the best type—the weighted valve—has not yet become popular. Vacuum gauges appear to be as inaccurate as ever, which stresses the need for a good fixed relief valve and for a gauge-testing service throughout the industry. The combination of leaks and slow pumps or pumps which have lost their efficiency still results

ANALYSIS OF MILKING SHED METHODS

Number of farm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Hand stripping	x		0	0	0	0	0	0	x	x	*	0	0	0	x	x			‡	*	0	x	0	x	0	x	x	0	x	0	x	0	xx
Cups pulled				x	x		x			§		0		x				0	§		§		x	x	x			x		x		x	
Cups straight on ..	x		x			x	x	x	x	x	x	x			x		x	†			x	x	x	x	x		x		x	x	x	x	
Cups delayed		x		x									x			x				x								x					x
Leg-ropes ..	0	0	x	x	0	0		x			x	0	x	x	x	x	§	§	x			x	x	x	0			x		§			x
Back chains	x	0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	§	x	x	x	x	x	x	0	x	x	x	x	§	x	x	x
Props ..		0			§		x	0	0	0	x	0	§	0	0	§	0		0	x				x				0					
Weights ..							x	x	0	0	0	0	§	§	x	§	x	†	0														
Disinfectant in wash water			x									x				x																	
Squirt taken	0	0	0	0	0	x	0	0	0	0	x	x	0	x	x	x	x	0	0	0	x	0	0	0	0	0	0	0	0	0	0	0	0

* Non-stripping until Christmas.
† Cows not washed, cups put straight on.
‡ Stripped until mid-January.
xx Double stripping.

x Method used.
§ Method used on some cows.
0 Method not used.
A blank indicates no record obtained.

"Cups pulled" refers to pressing down on the claw before removing the cups.
"Cups straight on" refers to applying the cups immediately after the udder has been washed.
"Cups delayed" indicates that some minutes have elapsed.
"Squirt taken" indicates the removal of a squirt of milk from each teat as a check on mastitis.

MACHINE MILKING . . .

in the air displacement of the machines in use being lower than it should be. That is unfortunate in view of the fact that two previous surveys showed a correlation between effective air displacement and speed of milking.

The popularity of the soft inflation continues. In the light of their relatively-poor cleaning methods, farmers in the survey use their inflations too long for really efficient milking. Regular changing of inflations is important in view of their probable association with udder disease when used in a dirty, stretched condition. Better cleaning methods are needed to reduce infection and improve the condition of milking rubberware generally.

The decline in numbers of useless "gadgets" is satisfactory, but the use of sight glasses should be more widespread if milking efficiency is to be improved. That there is room for more efficiency in the shed is shown by the average rate of milking of 7.6 cows/hour/set of cups, single-bail plants milking at 8.2 and doubled plants at 6.9 cows/hour/set of cups. An efficient single-bail plant with one man to three sets of cups, not stripping, can handle 10 cows/hour/set of cups, and one man working two double bails should handle about eight. Earlier work has shown that cups are often left on too long. The lack of sight glasses accentuates this tendency.

Related to milking speed is the question of manpower. If one man operates three single bails efficiently he can put through 30 cows an hour. For an actual milking time (neglecting cleaning-up time) of one hour, one man is needed for every 30 cows, plus a fraction of a man's time for the other tasks round the shed. On that basis the staffing of the sheds examined reaches the minimum.

Shed techniques vary enormously. Until a good deal more is known about dairy cow physiology a strict schedule cannot be set out dogmatically, but the following sequence is suggested as that most likely to produce best results in the light of present knowledge: Wash the udder thoroughly; take a squirt from each teat into a strip cup; apply the cups; when the flow falls pull the cups for a few pulsations (only if necessary, as this varies with the cow); remove the cups when the flow is practically stopped. Back chains are optional. There is no need for leg-ropes, props, or weights. The extent to which a procedure lines up with these requirements is a check on its efficiency. Judged by this standard, the group of farmers surveyed is not as efficient as it could be.

As a result of the survey the authors are satisfied that the simple equipment used is satisfactory for most testing purposes. The main problems of servicing are the testing of vacuum gauges, the checking of relief valves, the testing of pumps, the general adjustment of joints to eliminate leaks, and the setting of pulsators to a uniform pulsation from bail to bail.

There is a real need for more servicing. The sooner there is a widespread network of co-operative servicing units the more efficient New Zealand's milking machines will be.

REWORKING OF PIP FRUIT TREES

Trend of Scion Preferences Maintained

By A. R. GRAINGER, *Fruit Standardisation Officer, Wellington.*

THE preferences shown by growers in the choice of varieties of apples and pears when selecting scions for reworking trees were shown in statistics given in an article by R. E. Binfield in the "Journal" of August, 1946. These figures covering a period of six years no doubt have served as a useful guide to fruit growers faced with problems of reworking unprofitable varieties, and that the trend in commercial orchards which they disclosed is being maintained is shown by district reports covering the reworking of apple and pear trees in the Dominion during the 1947 grafting season.

IN commercial orchards 2688 apple trees and 449 pear trees were changed to other varieties by grafting during the 1947 season, and the preference of growers for varieties such as Golden Delicious, Granny Smith, and Gravenstein apples and Packham's Triumph and Williams Bon Chretien pears is being maintained. Illustrated below is a branch of an old apple tree changed to Golden Delicious by reworking.

As in the previous six years, the greatest amount of reworking took place in Nelson and Marlborough, where 1720 apple trees and 199 pear trees had new varieties worked on to them. The apple variety which was changed to the greatest extent was Delicious, and the numbers of Jonathan, Cox's Orange Pippin, and Dunn's Favourite were also considerably reduced by grafting.

Winter Cole pears have gained very little on the reworking in 1947, because though they were worked on in the Hastings district, this was offset by abandonment of the variety in the Nelson district.

Details of the 1947 reworkings are as follows:—

APPLES

Varieties Reworked

Delicious	812
Jonathan	491
Cox's Orange Pippin	401
Dunn's Favourite	288
Washington	165
Tasma	151
Other varieties (17)	380
Total apple trees reworked ..	2,688

Scion Varieties Chosen

Golden Delicious	1,118
Gravenstein	524
Granny Smith	464
Rome Beauty	140
Ballarat	126
Other varieties (8)	316
Total apple scion varieties ..	2,688

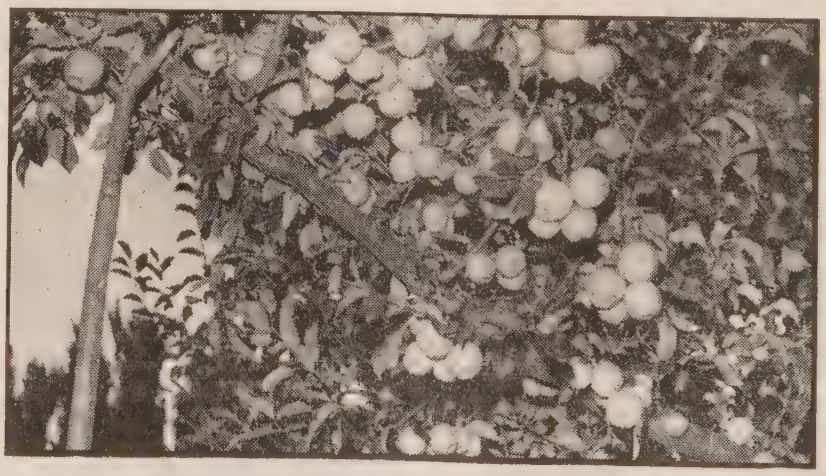
PEARS

Varieties Reworked

Winter Nelis	215
Winter Cole	120
D'Oyenne du Comice	56
Marie Louise	58
Total pear trees reworked ..	449

Scion Varieties Chosen

Packham's Triumph	133
Winter Cole	130
Williams Bon Chretien	110
Clapp's Favourite	76
Total pear scion varieties ..	449



[*Green and Hahn Ltd. photo.*

Branch of old apple tree changed to Golden Delicious by reworking.

FARMING IN NEW ZEALAND

North Auckland Peninsula

FARMING trends in the North Auckland peninsula, the part played by small holdings, the effect of the unsuccessful development schemes with which the district has been afflicted, and the possibilities of its future are discussed in this, the concluding section of an article by E. B. Glanville, Assistant Fields Superintendent, Auckland. The first, a general survey of the history and development of the peninsula, was published in the May issue, and the second, which reviewed the district county by county, appeared last month.

DURING the past 20 years great changes have taken place in the proportion as well as the numbers of sheep and cattle in the peninsula. Between 1920 and 1935 dairy farming made great progress at the expense of the raising of fat cattle on the paspalum-dominant pastures. Milking cows increased from 66,000 to 236,000 while beef cattle decreased from 195,000 to 139,000; at the same time, through the grassing of further bush burns on the hill country, sheep increased from about half a million in 1920 to more than a million in 1930, but fell in the next five years to 869,000 as a result of settlers' milking small herds for ready cash, and to some extent because of the pastures on the hill country deteriorating. Since then increased prices for primary produce have caused a trend toward the less laborious types of farming, with the result that, while milking cows have slowly increased to about a quarter of a million, beef cattle have increased to 183,000 and sheep have regained popularity and increased again to a million.

The sheep farming of today is much different from what it was originally in that it is now mainly for meat production rather than wool production. Characteristic features are the great fall in the proportion of dry sheep to breeding ewes and the rise in the proportion of Southdown to Romney rams. That can be illustrated by the figures for Otamatea County, where sheep farming has made most progress, perhaps because of the suitability of the limestone soils for this type of farming. The proportion of dry sheep to breeding ewes in this county was 48.6 per cent. in 1920 and only 13.3 per cent. in 1945, while Southdown rams increased from none in 1920 to 9.72 per cent. in 1925 and 34.32 per cent. in 1945. That trend is general in all counties of the peninsula.

Because of the valuable work done by cattle on the hill country in crushing fern, keeping second growth in control, and controlling the strong paspalum growth which is typical in the peninsula, a high proportion of cattle to sheep is carried, varying from 13 per cent. in Rodney County to 38 per cent. in Whangarei County. Many of the cattle are finally fattened on paspalum pastures instead of being sold as stores, which is usual in most other districts.

North Auckland farming is generally very mixed. For instance, some settlers are dairying on hilly country which has been raised from store sheep country by topdressing, others are raising fat lambs on former dairying country, and lamb fattening, cattle fattening, and dairying are sometimes carried on on the one property. This state of affairs has probably been brought about by economic upsets in the past, resulting in inequalities in the financial positions of farmers, but is partly the result of individual preference. On the whole, the progress of dairying in North Auckland seems to have been eclipsed by that of meat production in recent years.

Small Holdings

A noticeable feature of North Auckland farming is the number of small holdings which have been established near the main towns. Throughout the area are many Maori settlements where the occupants cultivate their maize and kumara patches, and in some of these settlements, especially those at Mangamuka and Whirinaki in the far north, excellent yields are obtained from these crops, which are grown in exceptionally-fertile soil. At Naumai, in Hobson County, the Maoris raise good crops of strawberries as well as maize and kumara.

The main area of small holdings is in Waitemata County, close to Auckland City. In this locality more than 2000 acres are in orchards, containing both pip and stone fruits, which grow well on the clay soils in the Henderson and Albany districts. The climate is not suited to the growing of such small fruits as gooseberries, currants, and raspberries, but strawberries and cape gooseberries grow in abundance, while tree tomatoes and chinese gooseberries also thrive in the sub-tropical climate and find a ready market in the southern towns. Many small holders also grow flowers for the market, and the production of early flowers in the Avondale and North Shore districts has developed into a profitable occupation.

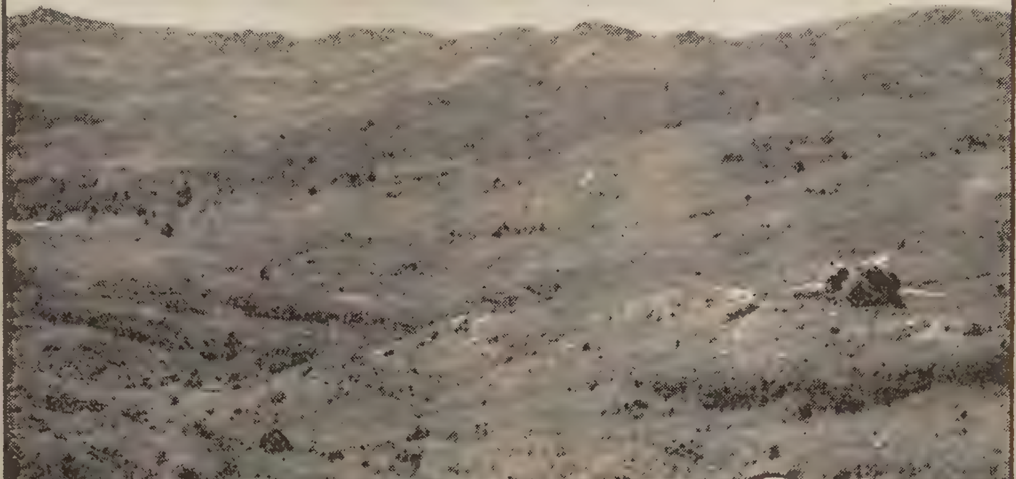
More than 300 acres are used for market gardening on these small holdings, and early potatoes are grown in the more sheltered, frost-free areas in the Oratia district, about 10 miles north of Auckland City; the crops are ready for the market as early as September and October. Tomatoes are also grown in abundance, particularly in the Avondale district, and it is from that area that the Auckland processing factories secure much of their requirements for sauces and pickles.

Poultry are also kept on a commercial scale on these small holdings, especially in the Henderson district, where some quite large flocks are run.

Pig Production

In an area devoted mainly to dairying, pig production is an important part of the farming. In the 1943-44 season pigs in the area totalled 86,288, of which sows one year and over were 11,396. The number of pigs killed at the Moerewa works has decreased since the war, in common with the decrease in pig meat production

ABANDONED LANDS OF NORTH AUCKLAND



Above—This hill country once carried kauri forest, but since the cutting out of the timber it has reverted to a scrub- and fern-covered waste. Right—Small sections ringed with flourishing shelter trees are all that now remain of unsuccessful attempts to establish citrus orchards on the unsuitable ironstone soils near Kerikeri. Below—In the late 1920's large areas of country in North Auckland were planted in tung oil trees. Because of the failure of the trees to thrive most of these areas now lie derelict.

throughout the Dominion. In 1939, the first year of the war, 42,551 pigs were killed; in 1947 the killings were 26,441, a decrease of 16,110. This decrease can be accounted for to some extent by the shortage of labour on dairy farms during the war and also by less attention being paid to sidelines on the farm because of the increased revenue received for the main product, butterfat.

This downward trend in pig meat production is general throughout the Dominion, and probably it has been brought about by factors other than shortage of labour, such as the shortage in the supply of cheap feed through more whole milk being used for human consumption, a reduction in the numbers of cows milked, and reduced areas sown to crops suitable for pig feed.

Unsuccessful Development Schemes

At various times during its development North Auckland has been subjected to several development schemes prompted by enthusiastic company promoters, and many thousands of pounds have been lost through these schemes being unsuccessful. Development companies have attempted to establish tung oil trees on many thousands of acres in the peninsula, attempts have been made to grow tobacco on a large scale, and endeavours have been made to establish citrus orchards on unsuitable soils. The areas chosen for these schemes invariably consisted of poor, scrub-covered, leached soils most unsuitable for the requirements of the plants intended to be established.

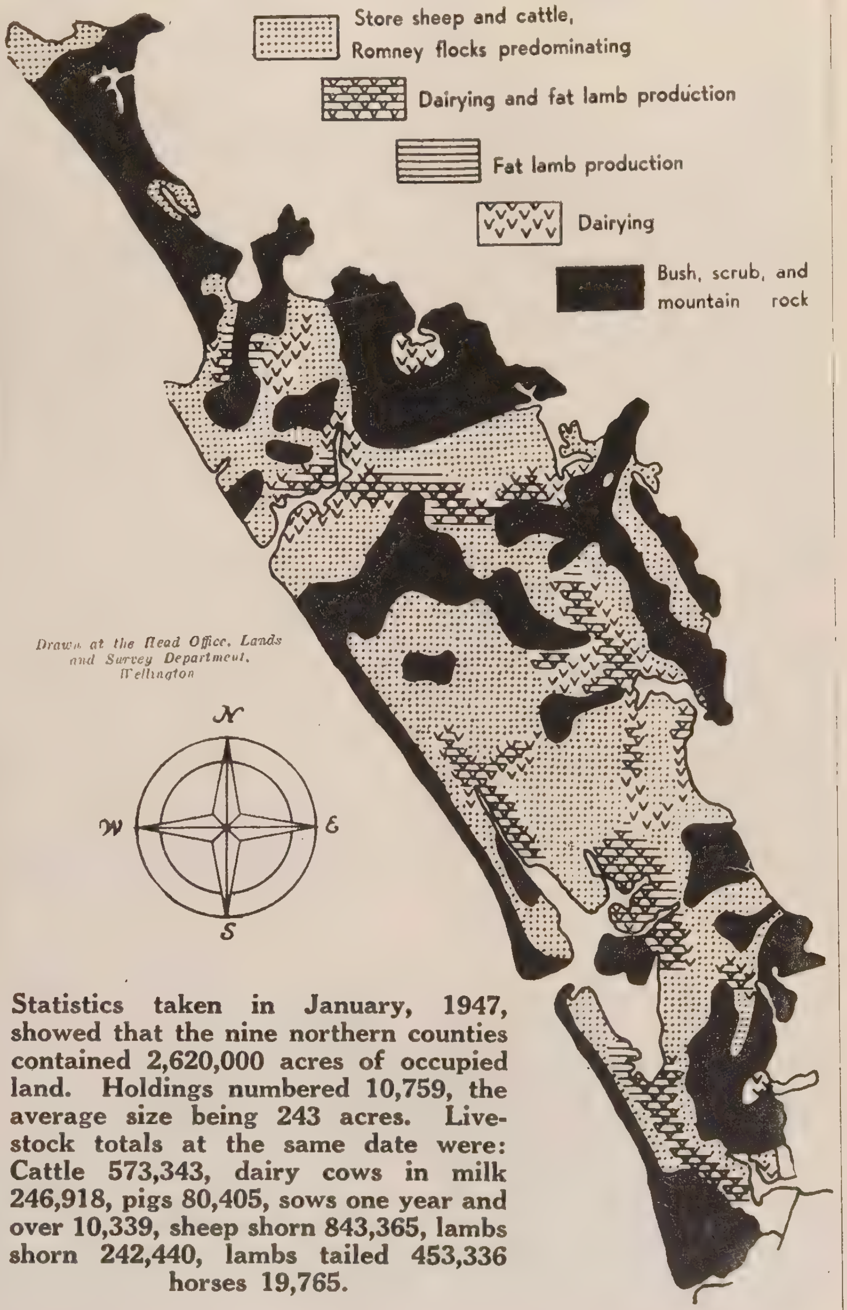
A vast amount of work was put into the preparation of land for tung oil trees with heavy cultivation implements and tractors. Then the cultivated areas were subdivided into small sections with shelter belts, and when the trees were planted out the schemes looked very attractive, but it was evident that little was known of the poorness of the soils and the nutritive requirement of the plants. In a few instances, where trees were planted on the better soil types, they did establish and produced a light yield of nuts, but they gradually failed to keep up production; several thousand acres failed to establish at all and were a complete loss. However, the shelter belts did thrive and today they stand out over the large scrub-covered area which was worked under these schemes as a reminder of the great financial loss which must have occurred in the venture.

Other areas were planted by development companies with citrus trees after subdivision into small sections with shelter belts. These areas were not nearly as large as the tung oil areas and were mainly on the ironstone soil or on the fringe of the Kerikeri citrus-growing area. The result was similar to that of the tung oil scheme, and the money spent in endeavouring to establish citrus orchards on unsuitable soils was a total loss.

Apart from these schemes, other development companies have had success where they have turned their attention to afforestation. Much of the poor, scrub-covered, leached North Auckland land which cannot be farmed economically is suitable for afforestation and some fine plantations of pine trees have been established. If the money lost by development companies in tung oil, tobacco, and citrus schemes had been used for afforestation, much of the land which today lies unproductive would be supporting good plantations which ultimately would be of great value to the Dominion.

Weed and Insect Pests

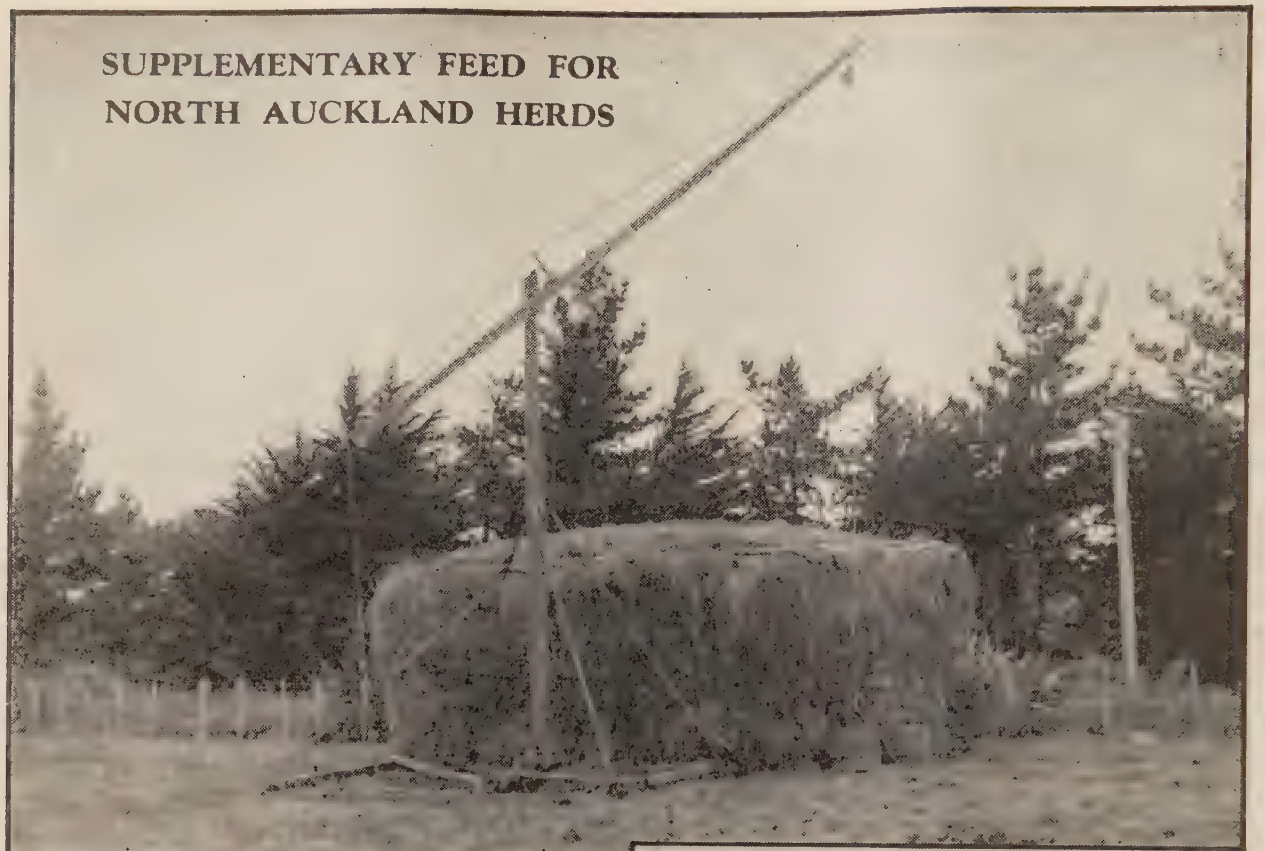
North Auckland, like all other districts in the Dominion, has its weed problem on farm lands. Fortunately ragwort, which is prevalent in some districts, is not of any serious consequence in the peninsula. Blackberry is prevalent in parts, especially on the undeveloped peat lands and some of the stony volcanic land, but it is not troublesome on land which is in good pasture, where it is controlled by grazing stock and mowing. Buttercup is a


Store sheep and cattle, Romney flocks predominating
Dairying and fat lamb production
Fat lamb production
Dairying
Bush, scrub, and mountain rock
N
W
E
S

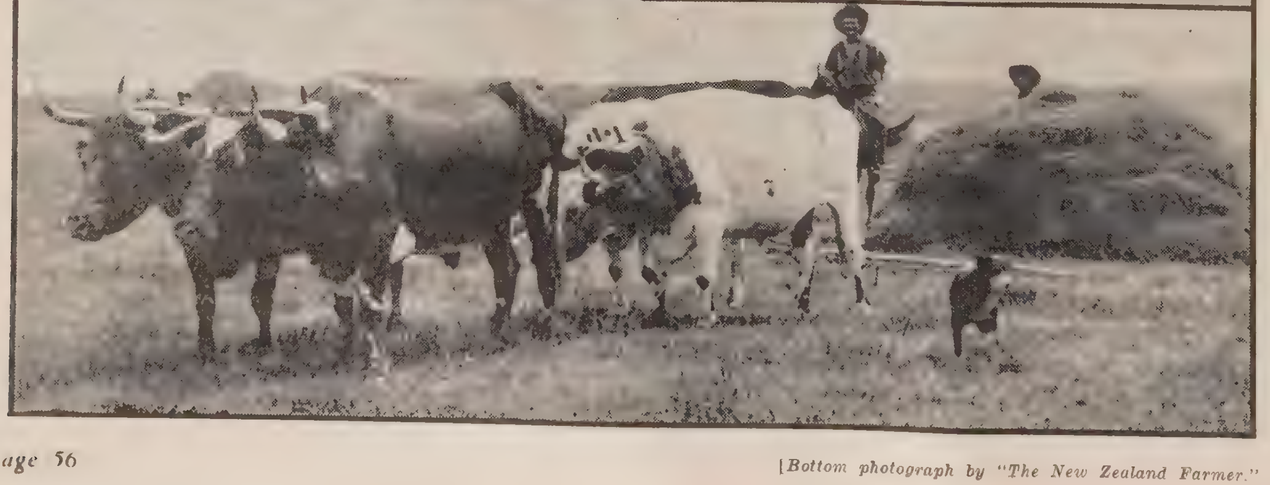
Drawn at the Head Office, Lands and Survey Department, Wellington

Statistics taken in January, 1947, showed that the nine northern counties contained 2,620,000 acres of occupied land. Holdings numbered 10,759, the average size being 243 acres. Livestock totals at the same date were: Cattle 573,343, dairy cows in milk 246,918, pigs 80,405, sows one year and over 10,339, sheep shorn 843,365, lambs shorn 242,440, lambs tailed 453,336 horses 19,765.

SUPPLEMENTARY FEED FOR NORTH AUCKLAND HERDS



More hay and silage should be saved on the majority of North Auckland dairy farms and more areas should carry crops such as soft turnips to provide milk-producing feed for the late summer. Farmers who attend to this important farm practice reap the benefit with high production. Above—A silage stack being built on a Northern Wairoa farm. Left—Cattle feeding on a root crop. Below—Bringing in material for hay with a bullock team at Ahipara, in the far north.



[Bottom photograph by "The New Zealand Farmer."

[Sparrow Industrial Pictures Ltd. photo.

A fertile valley in Hokianga County, portion being under cultivation by Maoris, with reverted, scrub-covered hills in the background.

troublesome weed on the swamp and river flat land. It infests pastures fairly thickly during the spring after a wet winter, especially where the land has been poached by winter grazing, thus opening up the pasture sward.

Gorse covers fairly-large areas in parts of the peninsula. It was first introduced into the Bay of Islands in the early days by the missionaries and was cultivated and used as stock feed. Now its eradication presents a problem on much of the poorer soils. However, many large areas of gorse-infested land have been developed and carry a good sward of high-producing mixed pasture.

Kikuyu grass, which was established in the early days of the development of the gumlands, has become a weed on many farms. It is troublesome in good pastures on land of high fertility, and if a plant or two becomes established it spreads rapidly, dominating and choking all other pasture species. Experimental work in the eradication of this grass in good pastures has recently been carried out, and it has been found that it can be killed with sodium chlorate used in fairly-large quantities.

With a warm, humid climate, insect pests and some crop diseases are found in North Auckland. Crickets and the caterpillar known as the New Zealand Army worm often cause serious damage to pastures and crops. The beetle of the grass-grub also damages crops during the later part of November when it is on the wing, and the grub damages pastures on the lighter soil types. These three pests, with the white butterfly and the diamond-backed moth, are the most serious insects with which the North Auckland farmer has to contend.

Fungus and bacterial diseases in farm crops are also prevalent, favoured by the humid, wet climate. Potatoes and tomatoes are very subject to late blight and these crops cannot be grown successfully without regular spraying. Crops of the brassica family are often attacked by club root, especially where crops of this family are sown in the same land for more than one year. Turnips are also attacked regularly by bacterial rot, but as these crops are usually sown for summer feed, they can often be used before the disease becomes serious.

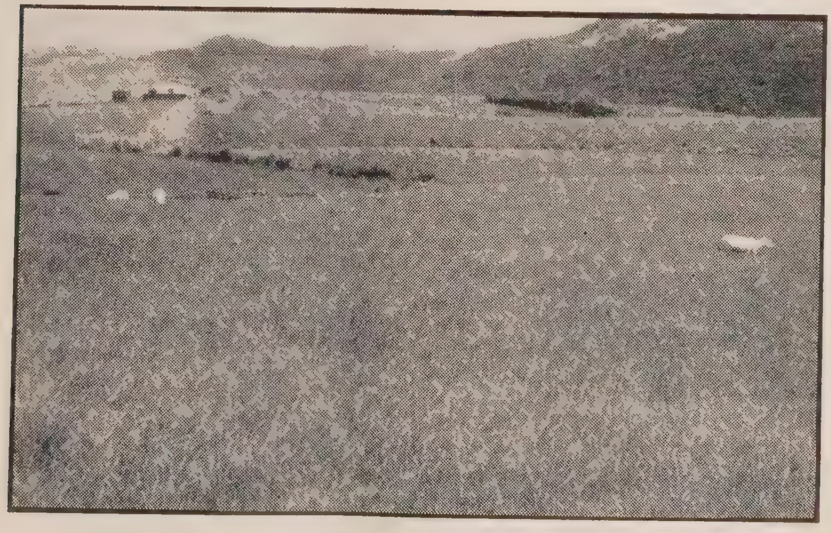
Future Development

It has often been said that so far the farm lands of North Auckland have only been scratched. That is true to some extent, and though development has been progressing rapidly, there is much more that can be accomplished.

The North Auckland farmer devotes his time to grassland farming and great strides have been made in primary production during the past 20 years, but much more can be achieved from the existing area of grassland by the introduction of new strains of ryegrass and white clover into the existing swards. Paspalum-dominant pastures are common on many farms and, because of the lateness of this pasture species in providing its great bulk of feed, the peak production of butterfat is not usually reached until December and January. It is desirable that peak production on all North Auckland dairy farms be obtained in October and held so that it extends to December and January, as it is in the Waikato. Some farmers have demonstrated that this can be done by correct pasture management and developing the ideal North Auckland pasture sward (perennial ryegrass, paspalum, and white clover) on most if not all of their farms.

To achieve this earlier peak in production it is necessary also to provide for adequate supplies of supplementary feed, which is required for the winter,. early spring, and late summer to keep dairy stock in good producing condition. More hay and silage should be saved on the majority of dairy farms and more areas should carry a crop such as soft turnips to provide milk-producing feed for the late summer. Though there are individual farmers who attend to this important farm practice and reap the benefit with high-producing herds, in general the provision of supplementary feed is far below that required to bring dairy stock through the winter in good condition and so enable them to reach high production early in the lactation period.

In addition to a steady improvement of the existing pasture land, many acres of scrub-covered land are being brought into grass each year. Practically all such areas being developed consist of very leached soils. Annual crops do not do very well on this land, and cropping before grassing, which is usual in the southern districts, is seldom payable in the north. It is more economical to prepare the land for grass by thorough cultivation and summer fallow than to grow a poor crop, which usually prevents adequate cultivation before the grass is sown in early autumn.



Young, fertile, consolidated sand country near the west coast.

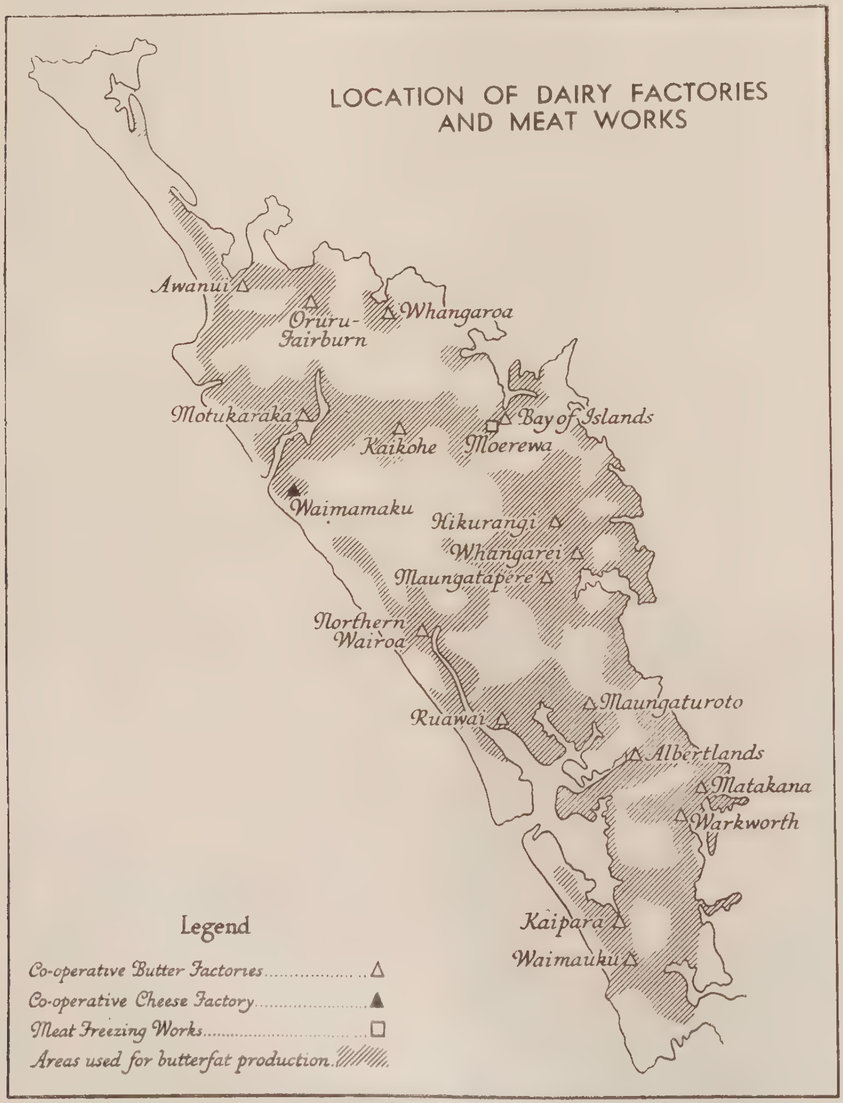
FARMING IN NORTH AUCKLAND . . .

Much of the undeveloped land presents problems in development, such as the shortage of water on many areas. Until recent years the development of the gumlands, of which there is still a considerable area, was considered a problem, but the grassing of much of this land does not now present many difficulties if adequate lime and phosphate is available. Lack of water is the main reason for many of these undeveloped areas lying idle.

Recovering Productivity

The main advancement in farming in the peninsula has been on the flat land and in the numerous fertile valleys or pockets, and much more can be achieved from these areas. Much of the hill country presents a real problem and has been farmed on a falling fertility, with second growth gradually replacing pasture plants. On many areas the second growth was burnt off and fresh grass sown, but it was usually found that the fertility of the seed-bed was much lower after the second burn than after the first. Some farmers have been able to handle this hill country quite satisfactorily with closer subdivision, allowing heavier concentration of stock under a system of rotational grazing and topdressing. Where these methods have been possible the pasture sward has remained tight and clean, preventing second growth from becoming established. Many thousands of acres of hill country have deteriorated so badly since they were cleared and grassed that they are quite unsuitable for farming and would be better suited to afforestation.

Large areas of hill country have fallen to a very low productive state but could be brought back to quite good grazing country with proper management. It is important that these areas be recovered, because the farmer on better land depends on this country for his breeding stock for the production of fat lambs for the export trade. If this deteriorated hill country is not brought back into production, the source of replacements for the farmer on the fattening country will diminish and the sheep industry in general will suffer. The answer to this problem appears to be a better understanding of the problem of hill-country pasture management by closer subdivision, topdressing with lime and phosphate, and the heavy concentration of cattle to check the persistent second growth.


LOCATION OF DAIRY FACTORIES AND MEAT WORKS
Awanui
Oruru-Fairburn
Whangaroa
Motukaraka
Kaikohe
Moerewa
Bay of Islands
Waimamaku
Hikurangi
Whangarei
Maungatapere
Northern Wairoa
Maungaturoto
Ruawai
Albertlands
Matakana
Warkworth
Kaipara
Waimauku
Legend
Co-operative Butter Factories .... △
Co-operative Cheese Factory .... ▲
Meat Freezing Works .... □
Areas used for butterfat production ▨

Drawn at the Head Office, Lands & Survey Dept., Wgton. N.Z.

It is usually the difficulty of wintering his cattle which defeats the hill-country farmer, and he should have areas of pasture suitable for cutting for hay and where possible establish pampas grass plantations to provide winter feed. The cattle are required to control the second growth in spring, when growth starts, and if supplementary feed is not available on which to winter them, they must be bought in on the high spring market—a most uneconomical way to obtain cattle for this purpose.

Farming Systems

In an area where the development of the farming lands is fairly recent it is difficult to be sure of the attainment of a permanent system of agriculture that gives full use of the land and yet preserves its fertility for the next generation. Quite often young countries have found that the system of farming they have established slowly converts the land into a wilderness. In North Auckland permanent systems of farming are being developed for the flat to rolling land adapted to dairying, but some of the methods of farming the moderately-steep land adapted to grazing cannot be regarded as permanent.

In addition to the areas of problem soils (for example, ironstone land) and some of the peaty soils which have not yet been economically farmed, other areas on the peninsula are unsuited to farming, mainly eroded claystone hills and areas of mature sandstone country. The few farmers struggling on them have little chance of success and such areas should not be settled further. It is not in the best interests of the community to have settlers spending their lives in a more or less hopeless struggle against Nature.

With the improvement of road access during recent years, permitting the increased use of lime and phosphatic fertiliser which is vital to practically all North Auckland soils, production can be increased enormously and if the problems mentioned are given close attention as further development takes place, North Auckland has a very bright farming future.

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TRELLISING AND PRUNING GRAPE VINES

THE object of trellising and pruning a grape vine is to make it conform to an ordered shape, designed to promote fruiting and facilitate cultivation, spraying, harvesting, and other vineyard operations. The grape vine is a climbing plant in the same botanical classification as the Virginia creeper. In its natural state it grows in a hopelessly-confused manner, spreading along the ground, climbing and festooning surrounding vegetation, and producing only a small crop of inferior fruit. By scientific pruning, training, manuring, cultivation, spraying, selection of varieties, and other attention, the vine may be induced to bear abundant crops of high-quality fruit. In a series of articles by F. Berry-Smith, Vine and Wine Instructor, Auckland, of which this is the first, viticultural practices will be discussed in accordance with seasonal application.

An amazing crop of grapes on an arched pergola.

THE three main systems of trellising grape vines are the low trellis, the arched pergola, and the complete overhead pergola.

The Low Trellis

Mainly because it costs far less than the pergola type, the low trellis is in most general use in commercial vineyards. Reinforced concrete strainers and intermediate posts are preferable to wood; the higher initial cost is compensated for eventually by a much longer period of service, though care has to be exercised to prevent damage by cultivating implements.

In Fig. 1 the strainer is 6in. x 6in. x 8ft. reinforced with four ⅜in. rods, allowing 3ft. 6in. in the ground and 4ft. 6in. above.

The dimensions of the stay are 4in. x 3½in. x 8ft. with two ⅜in. reinforcing rods. The recess to take the stay is moulded with the post. The foot of the stay is 1ft. below the ground to obviate any chance of it fouling implements and to reach more compacted soil.

The intermediate posts are 4in. x 4in. x 6ft. 6in. reinforced with two ¼in. rods. These posts are 2ft. in the ground. The distance between the posts in the trellis is 24ft. and in this space three vines are accommodated at 8ft. intervals.

The first wire is 20in. from the ground and of No. 8 gauge. By training the vine a good height from the ground, cultivation under the trellis is simplified and air circulation, which discourages fungoid diseases, is improved. This wire carries the fruiting wood and so most of the weight. Above this are two pairs of No. 10 gauge wires 34in. and 52in. from the ground. These wires are tied round the strainer post and fastened to the intermediates by tie-wires through holes in these posts.

The vines shown in the diagram are as they would appear after being pruned on the double guyot system. They carry two spurs and two 4ft. rods to each vine. The growth from these is trained between the two sets of wires above, which minimises tying of the laterals, a much more laborious task where only single wires are employed.

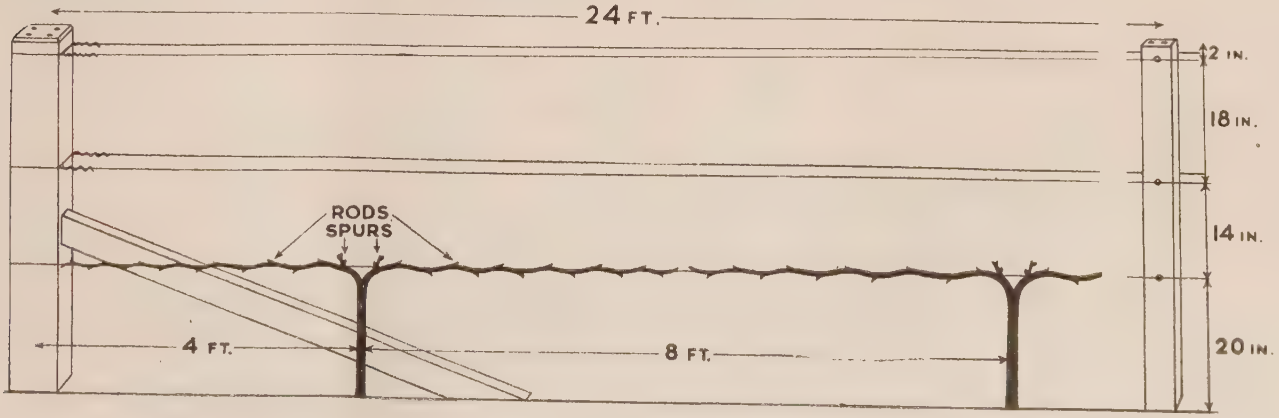


Fig. 1—A style of low trellising.

TRELLISING OF GRAPE VINES

[*Sparrow Industrial Pictures Ltd. photo.*

Wine grapes growing on a low trellis.

For tractor cultivation the distance between the trellises should be 10ft.

Arched Pergola

Both the arched pergola and the complete overhead pergola give a higher crop return for a given area where space is restricted than does a low trellis, but only vigorous vine varieties in fertile soil and ample rainfall are adaptable to this mode of training. For a beginner in commercial grape growing, with limited capital, the less costly low trellis is advisable.

The arched pergola style of trellis is costly to erect if it is to be satisfactory, as the heavy weight of the crop and wind pressure will cause a flimsy structure to sag and collapse. It is advisable to take a long view and make a strong, permanent job rather than to try to economise on materials and have a costly failure. For preference the pergola should run north and south.

In many instances vines trained on the pergola system have produced more than twice the crop from the same area trained on a low trellis, so the high initial cost of the pergola would be justified eventually by the crop returns.

All the posts in Fig. 2 are of reinforced concrete 6in. square, with a 1ft. length of 1½in.-bore galvanised water pipe let in to each to serve as a socket to hold the pipe arches. The arches and connecting pipes on the strainer ends and intermediate sections are all 1¼in. bore galvanised water pipe. The ends of the arches require 1/32in. turned off in a lathe for 8in. to enable them to fit into the pipe sockets in the posts. The pipes are joined by a special coupling and are not cut and threaded to fit the usual type of union, which would impair the strength. The perimeter of the arches is 16ft. and all the wires are No. 8 gauge 1ft. apart. It is advisable to have the pipes bent, drilled for the wires, and the ends turned off in a lathe at an engineering shop before taking delivery. The cost of construction of this trellis could be reduced by increasing the distance apart of the intermediates and raising the height to allow for the sag and give head room. The additional height would give greater inconvenience in pruning, picking, and other operations. For rigidity a pipe (9) runs along the top the full length of the pergola trellis, uniting the strainer sections on either end with the intermediate sections.

The vine is trained so that a permanent arm reaches to within 2ft. of the top of the trellis, and from this the fruiting rods proceed laterally at intervals of 2ft. along the wires numbered 1, 3, 5, and 7. The wires numbered 2, 4, 6, and 8 are for tying the lateral growth from the fruiting rods. All wires are No. 8 gauge, as a lighter gauge would accentuate the sagging. For every fruiting rod a spur of two buds is provided for replacing the rod the following year, so each vine has eight rods and eight spurs.

An arched pergola similar to the one described would enhance the appearance of the driveway of a private home.

Complete Overhead Pergola

In a complete overhead pergola the posts are spaced in 10ft. squares, and

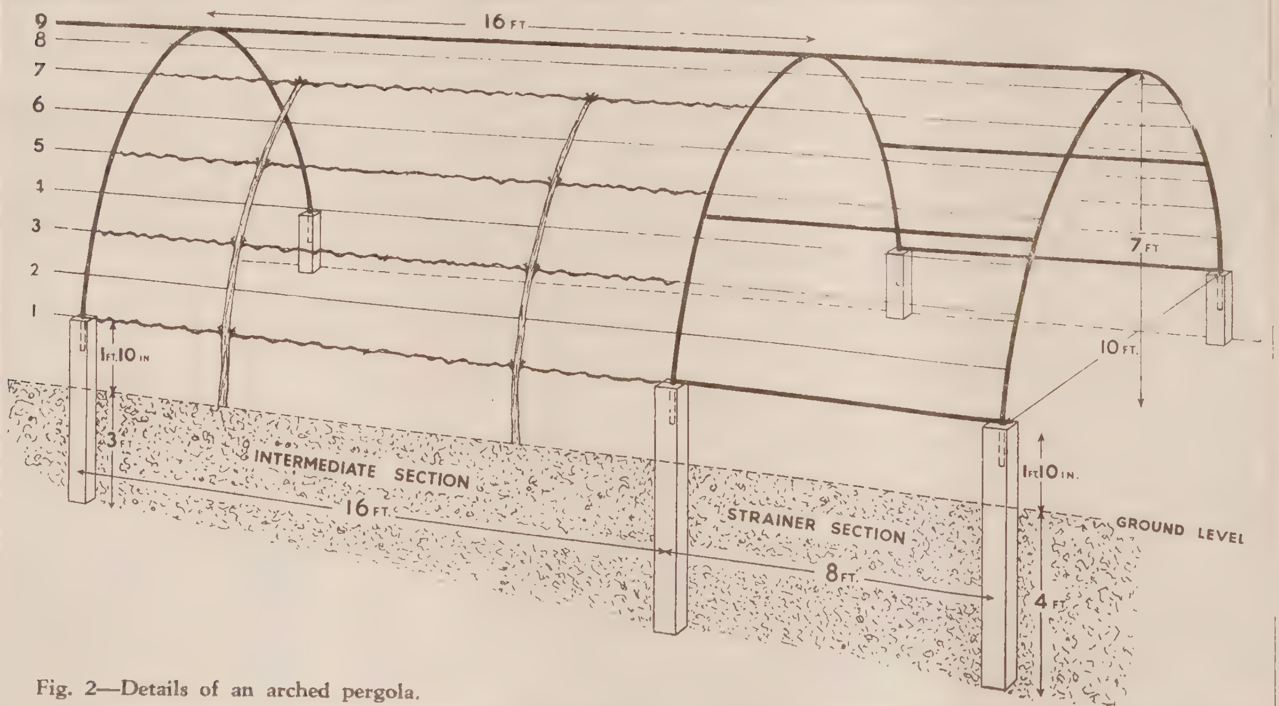


Fig. 2—Details of an arched pergola.

TRELLISING OF GRAPE VINES

[*Sparrow Industrial Pictures Ltd. photo.*

Portion of a canopy of grapes on an overhead trellis.

the lines of posts incorporating connecting pipes and stay wires on the perimeter of the system act as strainers on to which the overhead wires are strained. The strainer posts are 5in. square reinforced with four ¼in. rods, and the remaining posts are 4in. square reinforced with a single ⅜in. rod down the centre.

All the posts are 3ft. in the ground and the height above ground is 6ft. 6in. The wires are all spaced 16in. apart; those passing through the posts are No. 8 gauge and the remainder No. 10. In soft soil it is an advantage to place a 12in. x 12in. x 3in. concrete foot at the base of each post to prevent it from sinking into the ground under the great weight of the fruit and foliage.

A vine is trained up each post to form a permanent arm to the top of the trellis, and the fruiting rods radiate from this point as shown in Fig. 3. A indicates the strainer posts and B the intermediates, which are only few in number as the system is very condensed in the diagram. C denotes the stay wires on two ends of the trellis, and these are anchored to heavy concrete blocks as shown in the side view. On the other two ends a somewhat different method of straining is used, the strain on the outer posts being shared by the next inner posts by means of a pipe connection and stay wires anchored to an 18in. x 4in. earthenware pipe filled with concrete against the base of the outer strainer. D is a section of the trellis showing the network of wires passing through the posts and tied to the pipes running round the perimeter of the trellis.

Winter Pruning

The objects of pruning are to attain and maintain a suitable conformation of the vine and to enhance the quality and quantity of fruit produced. Vines should not be pruned until the leaves either have fallen or have turned colour and are about to fall. Before that, when the leaves are green, they are functioning and preparing foodstuff for nourishing the buds at their base and for storage in the canes in readiness for vigorous new growth the following season. Premature pruning has a weakening effect on the vine, but is sometimes practised within reasonable limits on late-ripening varieties to induce an early bud burst the following season, with the consequent advantage of a somewhat longer ripening period. The converse also applies, late pruning delaying bud burst and

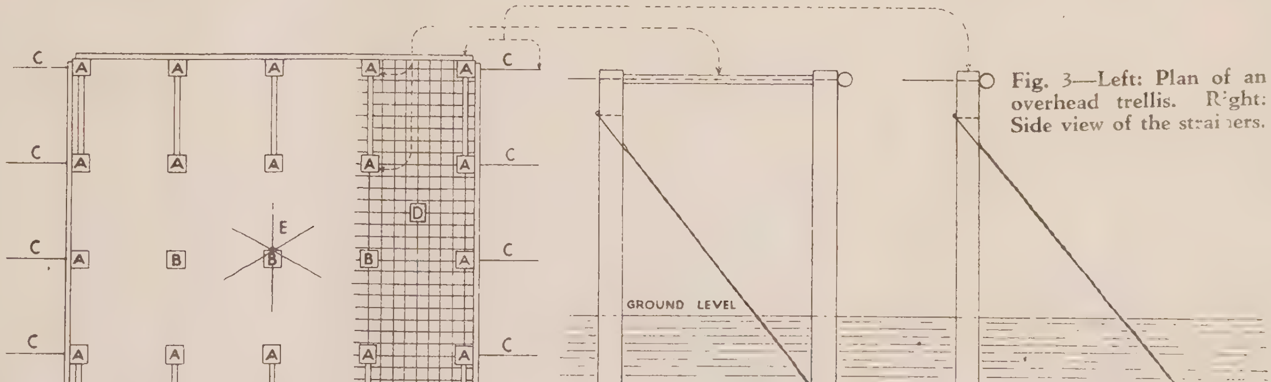


Fig. 3—Left: Plan of an overhead trellis. Right: Side view of the strainers.

being used in localities where spring frosts are likely.

The fertile fruiting buds of the vine occur on the one-year-old canes which grow from two-year-old wood. Bearing wood is selected from canes formed the previous season, which originated from similar bearers of the year before that. The canes which arise from the old wood are known as watershoots. These are not fruitful the year they appear, but in some cases can be used to adjust the shape of the vine or to renew an old, debilitated arm with extended spurs. Unless watershoots can be used thus they are useless and should be rubbed off (disbudded) when they appear, as should other unnecessary growth.

Several methods of pruning exist, but broadly all methods fall into one of two classes, short or long. In short pruning fruitful one-year-old wood is reduced to two buds (Fig. 4) and in the second method long bearers known as canes or rods are left (Fig. 5).

When long bearers or rods are left a spur of two buds to each rod is always provided as well to make wood to replace the rod the following year. In this case the top bud of the spur furnishes the new rod and the bottom bud the new spur, the old rod being removed entirely at pruning. Using the growth from the bottom bud for the rod and that from the top for the spur would result in unnecessary extension of the framework of the vine. Similarly, with spur pruning growth from the top bud of the spur is removed entirely and growth from the bottom bud reduced to two eyes to make a new spur.

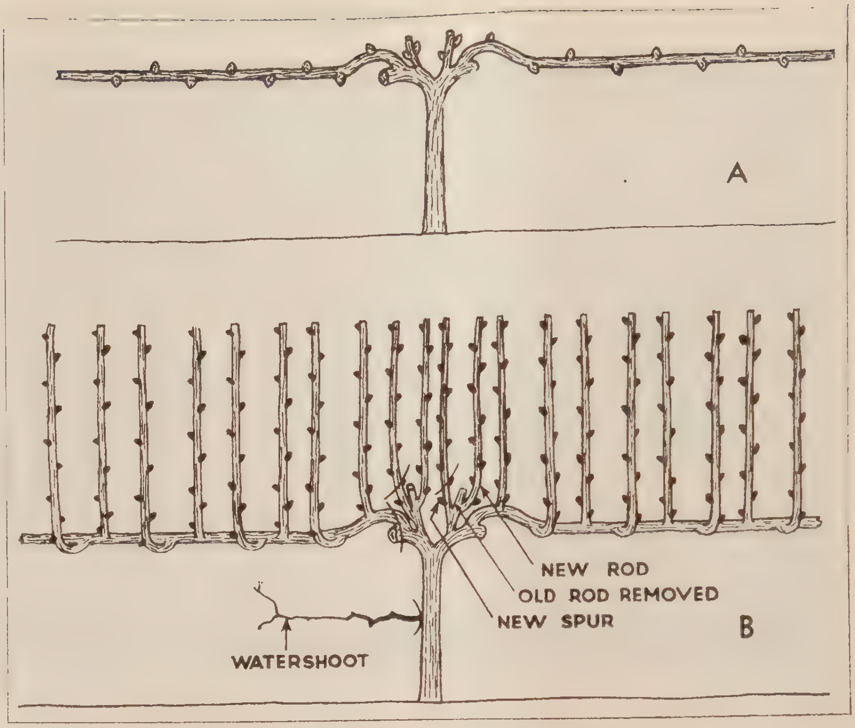


Fig. 5—Rod and spur pruning.

Some vines are better pruned long, because the most fruitful buds occur away from the base of the cane; others are pruned short because the fruitful buds are near the base of the cane. With others again the fruiting propensity of the buds is fairly even along the cane, and long or short pruning is optional; sometimes such varieties are pruned "half long", leaving four or five buds a spur instead of two. Two of the most common outdoor table-grape varieties are Black Hamburgh and Albany Surprise, the first of which is pruned short (spur pruned, as in Fig. 4) and the second pruned long (rod and spur pruned, as in Fig. 5). If Albany Surprise were half-long pruned—and it seems to do quite well on that method—it would appear similar to Fig. 4 but the spurs would be more extended.

If a vine is too vigorous, it bears little fruit and makes a lot of foliage and wood. When such a vine is pruned plenty of fruiting wood should be left to give the vine scope for its exuberance, but if a vine is weak, the wood left at pruning should be reduced commensurate with its strength.

Under conditions which induce vigorous growth in vines the system of pruning to retain long bearers is most successful for nearly all varieties, and that is so in most of the viticultural areas of New Zealand. The art in pruning is to judge the vigour of the vine and to leave wood accordingly. Undue suppression of a vigorous vine at pruning will be indicated by a profusion of watershoots and only a modicum of fruit. On the other hand, if an excess of wood is left at pruning for a number of seasons, the vine will be progressively weakened, as evidenced by spindly growth. In such a case the correct procedure would be to prune more severely.

There are quite a number of other systems of pruning, but the methods outlined are generally satisfactory.

Fig. 5 shows a vine long pruned and Fig. 5 (A) the same vine the following season before being pruned, with lines to indicate where the cuts are to be made. The procedure for spur pruning is similarly portrayed in Fig. 4 (A and B). In the case of a very vigorous vine trained as shown in Fig. 5 two rods instead of one may be left on either side, an equal number of spurs being provided; in this instance four spurs would be required because of the four rods. For a vigorous vine trained according to the system shown in Fig. 4 the fruiting wood is increased by providing additional spurs if extension is possible or by incorporating a number of short bearers at intervals along the permanent arm, which means departing from the original system to some extent.

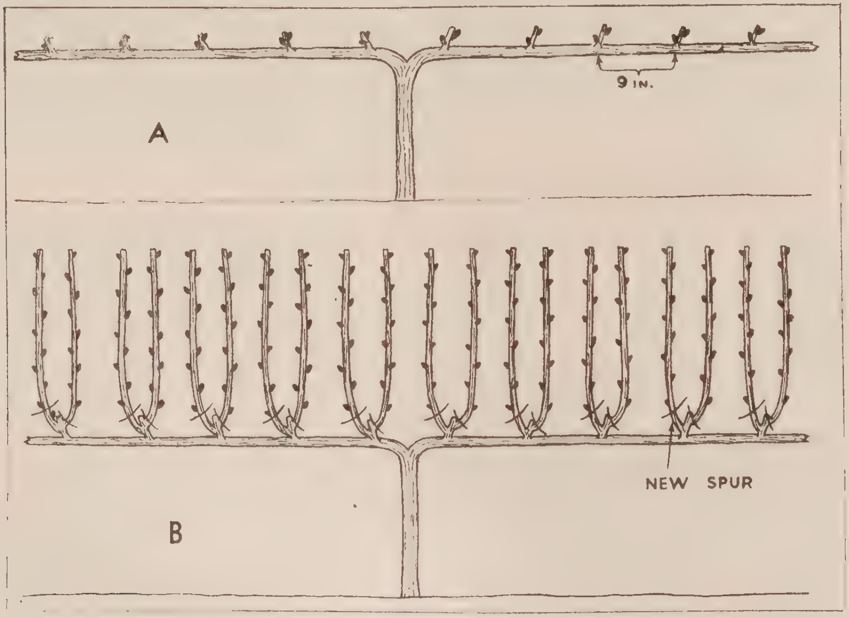
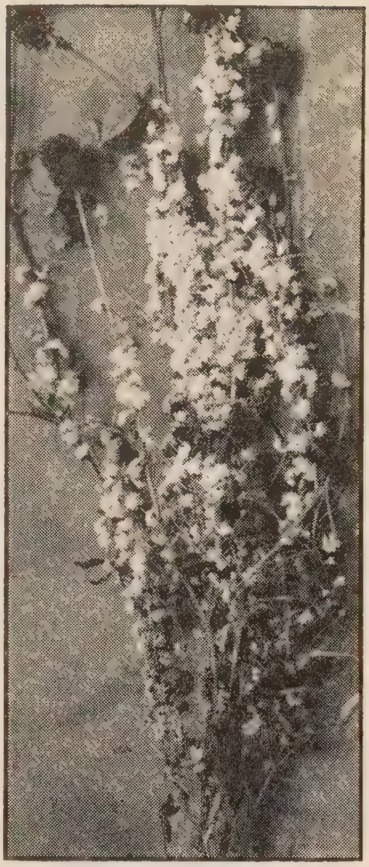


Fig. 4—Spur pruning.

DODDER INFESTATION OF PASTURES

A MEMBER of the *Convolvulaceae* family, dodder *(Cuscuta epithymum)* is a parasitic plant fairly prevalent in several west coast districts of the South Island and appears to be increasing. Unless immediate and thorough measures for control are taken it may cause farmers some concern in the future. J. R. Shepherd, Fields Instructor, Greymouth, describes the plant and the measures which should be taken to control it.



A red clover plant severely attacked by dodder, which is in full flower.

DODDER is a slender, thread-like, leafless parasite, the host plants of which belong mainly to the clover family. A characteristic of it is that plants, after first germinating from seeds, send up thin twisting stems which, on taking hold of the host plant, sever their connection with the soil, thereafter continuing life entirely by parasitic means.

Cannot Live Alone

Dodder is unable to live an independent life and unless it meets with a host plant it dies in a short time. It obtains its carbon in the form of organic carbon compounds from living plants. On meeting the host plant, the parasite winds round the stem and penetrates it with suckers at the points of contact, the root of the dodder withering away. It then sends out branches which are capable of separate existence if broken off, fresh infestation being established by this means. The original plant spreads until an area some yards square may be invaded by a tangled mass of brownish-pink leafless stems, which eventually may destroy large areas of the host plant.

Dodder is an annual plant which produces white or light pink flowers formed in bunches about the size of a pea. It is not uncommon for as many as 18 flowers to comprise a bunch, each flower producing two to four seeds. The seeds are much the same size as those of white clover, so if they are present in the field-dressed seed, dressing lines of white clover free from dodder is sometimes difficult.

Distribution and Control

Dodder occurs throughout New Zealand. It does not confine its activities to lucerne and white and red clover; other host plants include *Lotus major*, gorse, thyme, chrysanthemums, bracken fern, and other native species, including *Muehlenbeckia axillaris*.

The control of dodder need not be difficult because it is an annual and continued prevention of seeding will exterminate it. An infected paddock should be kept closely grazed to prevent flowering. Sheep are ideal for this purpose, but if stocking is insufficient, as may happen on a dairy farm, it is necessary to keep the mower going to prevent the dodder from making headway. Farmers would be well advised not to cut an infected area for hay or seed but to keep it grazed for a season or two until they are satisfied that extermination is complete. If only one or two patches are infected in a paddock which it is hoped to save for hay or seed, they may be kept cut with a scythe and the cuttings destroyed by being burnt or fed to stock.

A dodder-infested patch in a red clover crop grown for seed.

In two instances on the west coast the source of infection has been traced to seed mixtures and hay brought from outside districts.

Infected gorse plants should be cut and the cuttings heaped over the roots and burnt when dry enough. The use of kerosene or other inflammable material to encourage a hot fire is advisable. Frequent inspections should be made to ensure that all the dodder is killed, and any fresh growth should be dealt with on the spot.

Precautions

Immediately dodder is noticed the farmer should set about destroying it—the smaller the area, the easier it is to handle. When buying hay ensure that it does not come from an infected area. Always look at the Purity and Germination Certificate of seed and see that *Cuscuta epithymum* is not included among the impurities.

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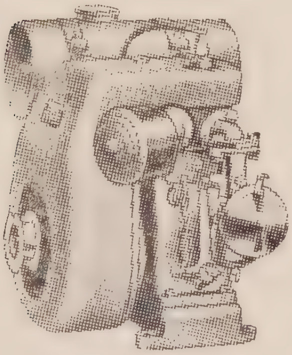

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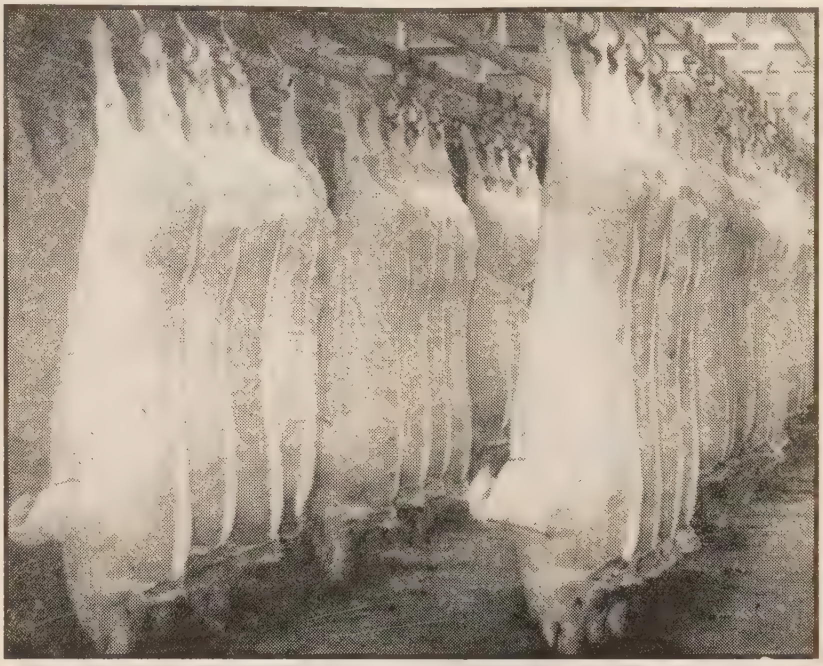
PRODUCING QUALITY PIG CARCASSES

LARGELY because of wartime conditions and the world shortage of pig meats, there has been a tendency in recent years for aspects of quality-meat production to be overridden by the pressing demand for quantity. However, producers in New Zealand must remember that the market for their primary products under normal competitive conditions depends on quality as well as quantity and consistent supply. It is therefore necessary to appreciate the quality aspect of meat production and in this article A. Longwill, Assistant Superintendent of the Pig Industry, Wellington, discusses the need for greater attention to the production of pig carcasses which will satisfy the British market and deals with methods of improving pig meat production.



[*B. Snowden photo.*

To meet market requirements carcasses must be of uniform weight and type.

THE two chief considerations in the production of quality pig meat in New Zealand are the requirements of the British market and the shortcomings of Dominion carcasses in meeting those requirements. The statements by Sir Henry Turner, of the British Ministry of Food, when he was in this country recently indicate that the time is not far distant when Britain will again be placing more emphasis on quality. Local bacon curers are already finding themselves embarrassed by receiving too many overweight pigs.

The Meaning of Quality

The quality of pig meat is judged in the carcass largely by the "finish," or the proportion, colour, and firmness of the fat. For porkers a quickly-grown 70 to 90lb. carcass full of meat but with only a light fat covering is required, and for baconers lengthy carcasses of 130 to 160lb. dressed weight and with proportionately-increasing fat cover are preferred. Definite weight ranges are preferred by the trade for both porkers and baconers, and producers should aim to finish their pigs within those weight ranges.

The organisation of production to this end under New Zealand conditions involves consideration of:—

1. The type of pig used for breeding stock,
2. A farrowing plan to fit feed supply,
3. Provision of essential supplementary feeds,
4. Feeding to produce quality meat, and
5. Finishing at the appropriate weight.

Type of Breeding Stock

The diagram on page 67 shows clearly the different rates of maturity of the different types of pigs. This difference of type is recognised by producers, most of whom have experienced as much variation among their own pigs as is shown on the diagram. With the increased attention which has been given to baconer production over the past ten years, there has been a noticeable swing from the typical porker type to the baconer type. This has been encouraged by trade reports and competitions, which have proved that provided they are well reared and kept in prime condition throughout, the later-maturing type of pig can produce the type of carcass suited to the modern porker trade at about 90lb. dressed weight.

However, there is still considerable variation of type even within litters, and the producer who is concerned with the quality of this output will have organised his whole pig enterprise so that he can draft out all pigs as they reach the desirable finished stage and will not waste feed and money by putting excess fat on the pigs' backs.

That there is a regrettable lack of uniformity in type in an average run of pigs on New Zealand farms is almost inevitable after a period during which type has been changed fairly rapidly. Obviously, before any degree of uniformity can be attained a consistent breeding policy must be followed for a number of generations. To understand the implications of this both nationally and as it affects the individual farm consideration must be given to this question: Should each farm specialise in either all-porker or all-baconer production, thus nationally maintaining two distinct types each capable of producing the ideal carcass for its own particular trade, or should the aim be a single type, and if so, what type?

From the quality aspect alone specialisation either for pork or bacon production has much to commend it. Denmark, Canada, Northern Ireland, and other countries which have concentrated on the production of bacon for the British market have produced a specialised product of very high quality and uniformity. Most of the pork eaten in these countries is in the form of smallgoods, a by-product of the bacon industry. By contrast, the British farmer, with a large market for fresh pork, has the choice of either market according to profitability at the time, and specialisation is not so marked. However, partly because of the inherent characteristics of the pigs bred and partly because of the feeding system the quality of the English porker, even in normal times, was in some respects inferior to that of the imported New Zealand porker. The latter is generally superior in having a high proportion of lean, and in recent years length has been improved. This has been accompanied by slightly-delayed maturity, porkers now averaging about 84lb. dressed weight, whereas the keenest demand pre-war was for the 60 to 80lb. New Zealand porker. Recent comments by the English authorities who inspected prizewinning porkers from W. and R. Fletcher (N.Z.) Ltd.'s pig carcass competition last year question the wisdom of a policy which is tending to change

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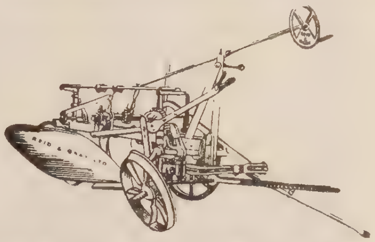

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GRAIN	10,500,000 TONS
DAIRY produce	1,000,000 TONS
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from the production of the early-maturing porker that made the name for New Zealand pig meats on the London market.

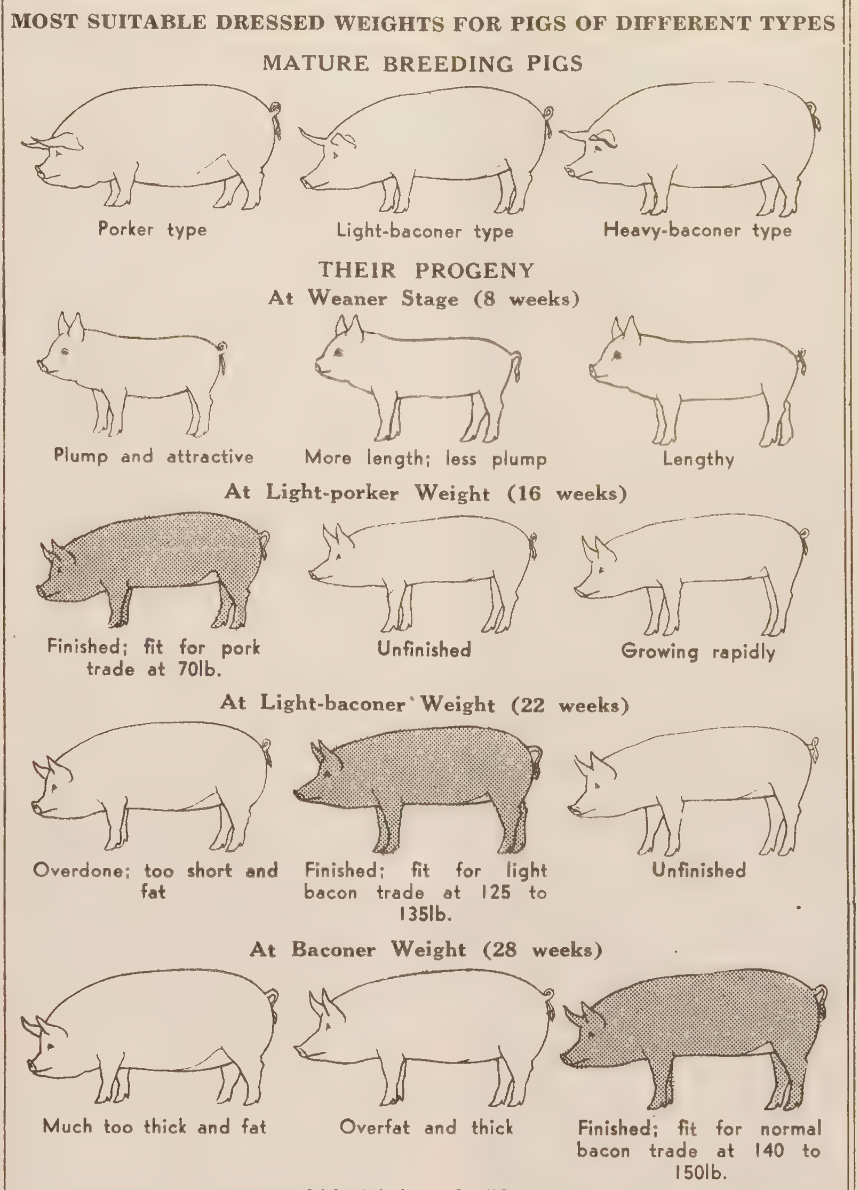
The wartime price structure has undoubtedly encouraged this trend, and any forecast of future market demand must as yet be very tentative. The local market now absorbs more than 330,000 baconers and 150,000 porkers, or about three-quarters of the present total production. These figures represent an increase of about 30 per cent. in bacon consumption and a decrease of 20 per cent. in pork consumption compared with pre-war. These changes if permanent, will have considerable effect on production policy. Until total production shows a substantial increase there will be few baconers available for export, and attention must be directed to the requirements of the local market. Such porkers as are available for export will go to the London market and should be of the quality which is required there.

A strong case can be made for breeding a specialised type of pig, provided the organisation of the enterprise, especially in regard to food supply, can ensure that all pigs can be regularly finished at the desirable weight. One of the major difficulties in any attempt to put such a breeding policy into operation under New Zealand conditions is the elimination of the great fluctuations in feed supply based, as the industry is, on a seasonal supply of dairy by-products. Unnecessarily-heavy sow overhead is involved in producing enough pigs to cope with the flush of dairy by-products as porkers, and many sows are not mated for a second litter because of the failing feed supply in the autumn making it difficult to finish such a litter if it is produced. On the other hand, though baconers can be finished to top weights in the flush of the season, it is more convenient and economical to sell the second litter as porkers.

Thus, though a few producers may be in a position to specialise, the general situation is one in which both baconers and porkers must be produced from the same parent stock. To do this an intermediate rather than a specialised type of breeding stock is required, and this policy appears to be the natural one under the existing conditions, though much remains to be done in improving the methods of breeding and selection of pedigree stock.

Farrowing Plan to Fit Feed Supply

To produce high-quality pig meat the feed supply to every pig at every stage of growth must be under effective control and not subject to violent changes. Under New Zealand conditions one of the essentials to the economical use of dairy by-products is to fit the supply of pigs as closely as possible to feed supply. By having second litters farrowed during the flush of the dairy season while first litters are being finished as baconers it is possible to avoid one of the pitfalls of pig raising—overfattening baconers when milk is plentiful. Under this system the second litters are finished mainly as porkers without the necessity for using much expensive supplementary feedstuffs.


MOST SUITABLE DRESSED WEIGHTS FOR PIGS OF DIFFERENT TYPES
MATURE BREEDING PIGS
Porker type
Light-baconer type
Heavy-baconer type
THEIR PROGENY
At Weaner Stage (8 weeks)
Plump and attractive
More length; less plump
Lengthy
At Light-porker Weight (16 weeks)
Finished; fit for pork trade at 70lb.
Unfinished
Growing rapidly
At Light-baconer Weight (22 weeks)
Overdone; too short and fat
Finished; fit for light bacon trade at 125 to 135lb.
Unfinished
At Baconer Weight (28 weeks)
Much too thick and fat
Overfat and thick
Finished; fit for normal bacon trade at 140 to 150lb.

[*Adapted from the "Queensland Agricultural Journal."*

These diagrams show how pigs of various types under uniform feeding reach their correct condition for slaughter at different weights.

Essential Supplementary Feeds

Though careful planning of farrowing dates can do much to minimise purchase of meals or growing of crops, to avoid forced sale of unfinished pigs it is necessary to have some safeguard in the event of a sudden drop in milk production. Supplementary feeds are required for wintered pigs, including farm-grown crops and protein concentrates, and limited quantities of concentrate foods are required for creep feeding and to ensure that the young pigs get a good start in life; the foundation of a quality carcass is the rapid growth right through to the porker stage. All the available evidence points to the fact that concentrates fed in addition to skim-milk or buttermilk after the pigs are well past the weaner stage and capable of consuming enough of the dairy by-products to maintain rapid growth have relatively-little effect in improving carcass quality. The relative food supply position and cost of meals in relation to the price of pig meat will finally determine whether it is worth while feeding concentrates in the finishing stages. With whey feeding, however, it will pay to supplement the feed with ½lb. of meat meal or other protein-rich concentrate per pig per day. By providing a balanced feed to produce early and rapid growth of lean meat this not only promotes quality-meat production, but improves economy of weight gain.

A correctly-finished 150lb. baconer carcass of the right type.

Feeding to Produce Quality Meat

Rapid growth in the first four months of the pig's life, whether it is being produced for pork or bacon, is necessary. The natural tendency for the animal to grow relatively more skeleton and muscle than fat in the early stages of growth must be fully exploited if the final carcass is to have the correct proportion of lean to fat. To obtain quality and tenderness of the lean (securing the desirable "marbling") it is important that pigs should not be allowed to have any "store" period. Pigs which have gone through a store stage and are then full fed to finish them are likely to have put on too much backfat before they recover the desirable marbling in the lean meat.

In the case of porkers there is relatively-little danger of getting too much fat on the carcass until 80lb. dressed weight is exceeded unless the pigs are of the short, early-maturing type, which is much less common today than it was 20 years ago. Such pigs should be finished as 70 to 80lb. porkers. Producers should check their conception of the correct finish for their own pigs by following a line through the works occasionally. In finishing baconers avoidance of full feeding, with its resultant over-fattening, is important both to quality of carcass and economy of feeding. This is an idea which many producers find difficult to grasp until the results are seen in a demonstration of carcasses on the hooks. If pigs have grown rapidly to about 140lb. live weight or about 100lb. porker weight in 20 weeks, they will be consuming about 5 food units a day at this stage. From then on feed should be restricted a little below appetite. The degree of restriction to secure a correctly-finished carcass of, say, 140 to 160lb. at 25 to 27 weeks will depend on the type of pig, but with the average baconer-type pig, which is aimed to be finished at 150lb. at 26 weeks old, increases equivalent to about a sixth of a gallon per pig daily each week will bring the ration up to 6 gallons of skim-milk or its equivalent, and this should not be exceeded. It is a mistake, however, to restrict feed so severely that the pig's live-weight gain at this stage is less than 1¼lb. daily. A daily live-weight gain of 1½lb. over the last six weeks should be the aim to produce a good finish with firm fat. If the pig is of the type which will be over-fat if taken on at this rate, it should be finished at light-baconer weight of, say, 130 to 140lb.

AVERAGE BACKFAT MEASUREMENTS OF 1152 PORKERS

Weight range lb.	No. of pigs	Shoulder fat			Loin fat		
		Measurement (1/16in.)	Deficiency or excess (1/16in.)	Points (10)	Measurement (1/16in.)	Deficiency (1/16in.)	Points (15)
60-75	339	11.6	— 1.4	8	6.5	1.5	12
76-90	453	13.9	— 0.1	9	7.7	1.3	12
91-105	276	16.5	+ 0.5	9	9.7	0.3	14
106-120	84	18.1	+ 1.1	8	10.7	0.3	14

— Indicates deficient fat. + Indicates excess fat.

Finishing at Appropriate Weights

The early-maturing type of porker will reach the desired degree of finish at about 70lb. carcass weight at about the end of the fourth month. That many porkers today are not properly finished until they are 90lb. carcass weight is shown by the table below, which gives the average backfat measurements of 1152 porkers entered for the pig carcass competition conducted by W. and R. Fletcher (N.Z.) Ltd. in 1946. The table also shows the extent of excess or deficiency of backfat as compared with the ideal standard and the average points scored by all the pigs in each weight range.

Judged on degree of finish alone the measurements of the 91 to 105lb. group in the table are obviously nearest to the ideal. This weight is heavier than the trade normally requires, which supports the English authorities' warning that New Zealand may lose its special place on the United Kingdom pork market if the trend away from the early-maturing type of pig is continued.

In considering the appropriate weight at which to finish baconers it must be remembered that New Zealand has not generally a highly-specialised baconer type of pig which can be taken safely to heavy bacon weights. Under the existing price structure there has been a tendency in recent years to produce heavy-weight pigs, for which under more competitive conditions it would be difficult to find a market. Results of nine years of grading baconers have shown that, whereas 85 per cent. of pigs between 121 and 160lb. are graded prime 1, only 73 per cent. of those over 160lb. reach this grade. Yet in recent years 40 per cent. of all baconers killed have exceeded the 160lb. weight. The threat to the general level of quality of baconers is clear.

Analyses of the measurements of large numbers of baconers entered for carcass competitions (and these are presumably above average) show that at all weights New Zealand baconers tend to carry too much backfat for their weight, but that the excess does not reach serious proportions until 150lb. is exceeded. These facts lead to the conclusion that the aim should be to finish the average type of baconer at weights not exceeding 150lb. A further quality consideration is uniformity of weight and type. Therefore, the aim can be narrowed down to finishing in the 140 to 150lb. carcass weight range. More pigs must be reared before this aim is achieved, which indicates the need for careful planning of the feed supply and the fitting of the supply of pigs to such planning.

Home Gardeners Feel the Urge to Sow

By A. G. KENNELLY, *Instructor in Vegetable Culture, Christchurch.*

WHETHER or not July is considered the beginning of the garden year, it is in August that the urge to plant and sow is most generally felt by home gardeners. Sowing and, to a less extent, planting are not, however, matters to be determined by the calendar alone; soil and air temperature, tilth, drainage, and soil moisture are even more important. Soil is usually in the right condition for sowing if it does not stick to the soles of the boots when walked on; though soil condition is less important for planting, results are always better where the soil is in the right condition.

[*Green and Hahn Ltd. photo.*

It is in August that home gardeners generally feel the urge to sow. The soil is generally in the right condition for sowing if it does not stick to the soles of the boots, but it is often advisable to step on pieces of wood to avoid over-firming the seed-bed. The flow of seed into the drill can sometimes be improved by sowing from a slip of paper folded into a V.

THOUGH the seed of most hardy vegetables can now be sown in well-drained soil in favourably-situated gardens, there should still be no great urgency to make large sowings of individual vegetables. Carrots, turnips, radish, beetroot, onions, spinach, silver beet, peas, lettuce, salsify, Chinese cabbage, parsley and many other herbs, cauliflower, and summer cabbage can be sown if conditions are favourable; in the south a small early sowing of parsnips may be made. Lettuce, silver beet, early cabbage, and, where conditions are not too severe, cauliflower can be set out. Even in colder districts sowings can be made if cloches are used, though for the best results cloches should be in position 10 to 14 days before sowing.

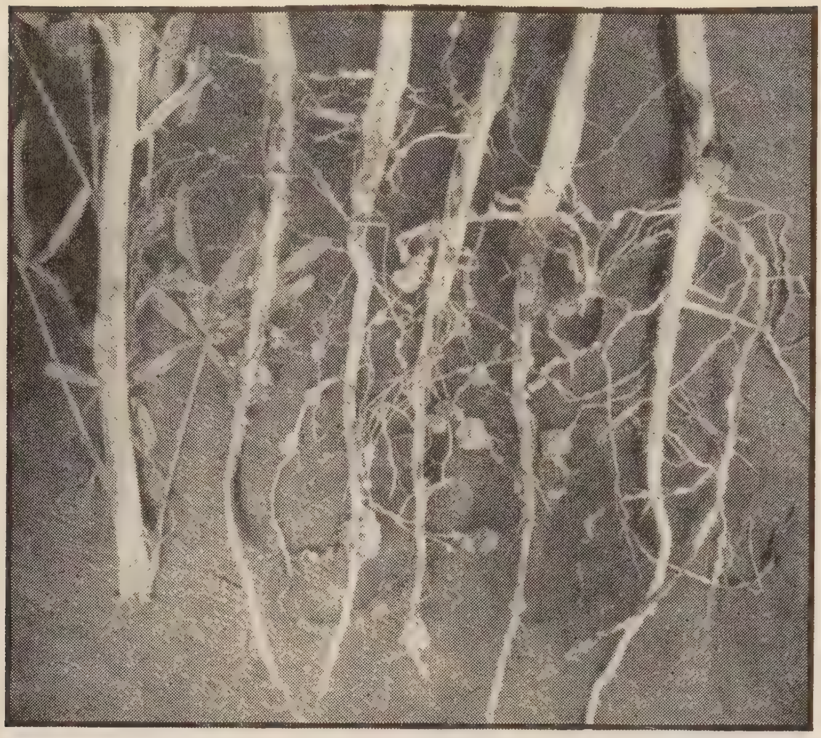
In the well-planned garden there should now be considerable areas that were dug over earlier and either sown in cover crops or left rough to be exposed to the weather. August is a good time to dig in green crops. As a heavy green crop takes some time to rot down after being turned in, digging should be done in good time. The value of lupins as a green crop has long been recognised, but to obtain maximum benefit and unless the area is needed urgently digging should not commence until there is considerable development of nodules on the roots. The nodules are caused by nitrogen-fixing bacteria which live in partnership (symbiosis) with leguminous plants; each nodule is the home of millions of bacteria which enter the roots from the soil. The plant supplies sugar and in return the bacteria supply nitrogen in the form of compounds which the plants can use. This nitrogen is made available to the succeeding crop by the breaking-down process which follows the digging in of the plants.

Because so much ground is usually vacant and rains can be expected then, August is a good time to apply lime, and most soils which have not been dressed for the past year, especially in high-rainfall areas, will benefit from the application of at least 2 to 3oz. a square yard. Though it should not accompany the lime, it is a good plan now to apply a general artificial fertiliser which should be lightly forked in; it should contain nitrogen, potash, and phosphoric acid, and will in most cases obviate the necessity for making individual fertiliser applications to each crop at sowing or planting time.

Damping off of Seedlings

Loss of seedlings through "damping off" is common in home gardens where soil has not been sterilised or where after sterilisation there has been recontamination from such sources as infected water, soil bins, pots, or seed boxes. Damping off is caused by one or other of a number of parasitic organisms commonly present in unsterilised cultivated soils. The loss, however, can often be largely attributed to the physical conditions under which the seed is sown. Seed or seedlings are less frequently affected by the diseases causing damping off—some of which are only weakly parasitic—if plant food and soil texture, temperature, moisture, and drainage are satisfactory and if seed is not sown too deeply and spacing of the young plants is adequate.

Damping off can usually be checked when it appears by applying to diseased seedlings and unaffected ones nearby a suspension of cuprous oxide (copper carbonate or red or yellow copper oxide in finely-powdered form) and water at the rate of about ½oz. per gallon. Brassicas (plants of the cabbage family) may suffer damage from application of this material, but



[*Green and Hahn Ltd photo.*

To obtain the maximum value from lupins as a green manure the crop should not be dug in until there has been considerable development of nodules on the roots.

Cheshunt compound can be used as an alternative. Most seedsmen stock it, but it can easily be made by mixing and crushing together 2 parts of finely-ground copper sulphate and 11 parts of fresh ammonium carbonate. The mixture should be stored in a tightly-corked stone or glass jar for at least 24 hours; 1oz. should be dissolved in a little hot water and added to 2 gallons of water for watering seedlings. The solution should not come into contact with metal, though a metal can is satisfactory if it is well painted.

Use of Seed Protectants

Seed can be prevented from rotting in the soil to a great extent by treatment with seed-protectant dressings usually obtainable from chemists or in proprietary lines from seedsmen. These dressings are probably more commonly used for seed sowing outdoors, but the Plant Diseases Division of the Department of Scientific and Industrial Research has shown in particular the value of seed dressings in the prevention of damping off of tomato seedlings in unsterilised soil and of the importance of using the appropriate dressing under suitable conditions and at the correct strength. For instance some of the substances which were most effective against the most troublesome soil organisms showed a tendency to inhibit growth, and if used even slightly in excess of the prescribed rate were likely to cause serious damage. None of the materials tested gave results comparable with sowing in sterilised soil, but results were sufficiently good with certain of the materials to warrant a recommendation that they should be used by growers who do not have the facilities to sterilise.

Organo-mercury dusts or high-grade copper carbonate were specifically recommended for the conditions under which the tests were carried out. Organo-mercury dusts are obtainable as proprietary lines and for the copper carbonate a high-grade basic copper carbonate having a copper content of 50 to 54 per cent. and a very fine particle size should be chosen.

Overseas workers also report improved "stands" of brassicas, dwarf beans, beet, and tomatoes with organo-mercury dressings, but that injury can result if the material is used for the seed of lettuce or onion. Cuprous oxide (red or yellow copper oxide) is another substance used for certain seed. It is valuable as a seed protectant for early peas, but may cause injury to some varieties or if the seed is sown on a very dry soil. This material has also given good results with cucumber, lettuce, and tomato seed, but should not be used with brassica seed.

A third substance, zinc oxide, which can be obtained from a chemist has given improved "stands" of beetroot, brassicas, carrots, lettuce, onions, parsnips, tomatoes, and spinach. It should be in as fine a form as possible and the seeds should be shaken in it until they are white. Excess powder should be removed. Though with proprietary lines the manufacturer's instructions should be followed closely, the general method of treating is to shake a small amount of the seed protectant in a container until the seed is coated and then remove the excess powder.

August Sowing Under Glass

In some districts frost-tender subjects such as tomatoes, cucumbers, marrows, pumpkins, and melons can now be sown under glass to be ready for setting out when frost danger is past. Though the time taken to produce good plants for planting in the open varies according to the treatment given, tomatoes started in warm conditions take about six weeks and the other subjects mentioned about half that time to reach a suitable state for planting out. Cold conditions of course retard and warm weather accelerates the rate of development, and sowing must be governed by the facilities available and the incidence of damaging frost. Date of sowing therefore varies from about the third week in October in some northern districts to the second week in November in most southern districts.

Artichoke, Globe *(Cynara scolymus)*

Globe artichokes are not much used in New Zealand. The scales of the huge immature flower buds are the edible portion, and though the taste is an acquired one, the vegetable is highly prized by connoisseurs. It is the only true artichoke. The globe artichoke is also known as the French or burr artichoke and is a perennial not unlike a large thistle. Edible flower heads can be produced the first year if seed is sown in August under glass and cultural conditions are favourable. Alternatively seed can be sown in September or October in drills 12in. apart and the plants later thinned to 8in. apart; early the following season the plants should be set out in their flowering positions 30in. apart in rows 4ft. apart.

Artichokes are hardy on well-drained soils, but in districts where winters are severe they should be lightly earthed up during prolonged cold, wet periods. There are several varieties and it is desirable to grow only the best.

Artichokes grown from seed of unknown stock are sometimes disappointing, but a good stock can be perpetuated if the plants are grown from suckers, though plants from this source rarely thrive as well as plants from seed, especially in a dry season. Suckers should be planted firmly and deeply when about 9in. high; this is usually in October.

Artichokes should not be allowed to become dry during the growing season and planted suckers especially require water.

A plantation of artichokes may last up to five years in rich soil, but on poorer soils results are likely to be disappointing after two years. Each year after establishment plants should have all but about four of the strongest suckers removed, and to obtain big flower heads lateral buds surrounding the main head should be removed when about the size of a hen's egg.

The preferred soil is rich and deeply cultivated, though the plant will grow and produce flower heads in almost any well-drained soil that is not permitted to dry out. In late autumn the stalks should be cut to within about a foot of the ground, and if the plantation is to remain, it should receive a liberal dressing of organic manure.

Probably for the average home gardener the chief objection to globe artichokes is the large amount of space they occupy in comparison to their yield. They are, however, rather ornamental, and a few plants would help to provide variety in gardens having the space.

Buds may be prepared for the table in a number of ways; the small side buds may be eaten raw or fried, but the main bud is usually boiled and the inner leaves and the fleshy part of the outer leaves eaten like asparagus.

Chards

When summer growth of globe artichokes is blanched for eating it is known as chards. Blanching is rarely practised in New Zealand, but may be of interest to those who like to try something different. Early in January selected plants should be cut back to within 6in. of the ground and well supplied with water until March, when the leaves should be bunched and tied and the plants earthed up. About six weeks are required for blanching, and as little growth will be made during that time it is important that the plants should be well manured early in the season so that good growth results after cutting down before blanching.

Asparagus

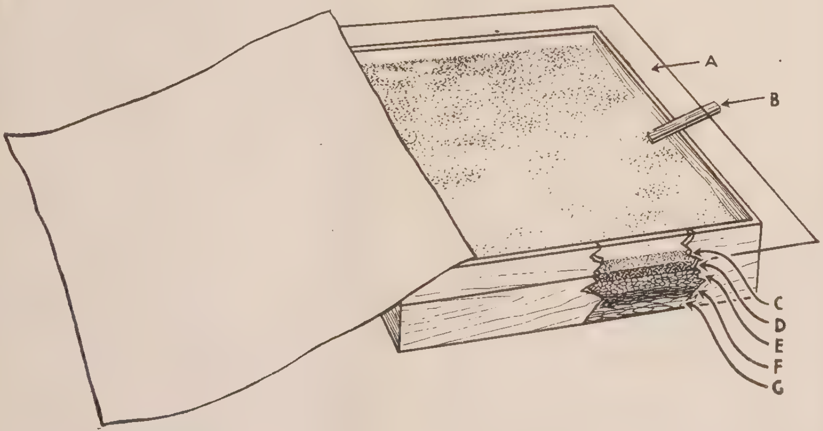
Because asparagus is harvested at a time when in most gardens vegetables are scarce or lacking in variety, it deserves to be more widely grown. Its popularity in New Zealand is increasing, as it is rich in vitamins and has a delicious flavour. Its low yield in comparison with such crops as cabbage, cauliflower, and carrots is a disadvantage only in small gardens where space is at a premium.

In the North Island August is usually the best month for planting asparagus; later planting is advisable in most southern districts where growth begins later and soil conditions in August are often unfavourable.

One-year seedlings are usually preferred, as they transplant better and establish more readily than two-year-old crowns, which are considerably larger and therefore more subject to damage during transplanting. Popular varieties are Mary Washington, Martha Washington, Connovers Colossal, and Paradise, a newer variety which is specially noted for its quality of spear and general vigour.

Asparagus is a perennial, and once properly established, if good cultural methods are followed, it may be cut each spring for seven or eight consecutive weeks. Beds last 20 years or more and if a new one is planned, its situation should be deeply dug and well manured with material such as well-rotted stack bottom, stable or farmyard manure, or compost. All perennial weeds should be removed and if necessary the area drained by breaking the subsoil or in more extreme cases by installing field drains. Built-up or raised beds are an advantage where the surface soil is shallow or drainage poor.

SOWING IN SEED-BOXES



Most seeds germinate more quickly if the seed-boxes are covered. Glass (A) or paper or both may be used, but if paper is used, it must be removed as soon as the seedlings appear. If the glass is to be left for a time, as is necessary with certain plants that require further protection or stimulation, ventilation must be given by placing a small piece of wood (B) under the glass on the edge of the box or by turning the glass over regularly. It is important that excess moisture should not accumulate on or near the soil surface, as it provides a congenial environment for the development of fungi and mosses inimical to the growth of seed or seedlings. Key to composition of soil in seed-box: C—Dust-fine soil for fine seed. D—Fine soil. E—Coarser soil. F—Rough, fibrous turf. G—Leaf mould (the leaves are not broken up, but are laid flat).

In the home garden crowns can be set about 8in. below soil level with the roots spread evenly over a small heap of soil in the bottom of a trench. The top bud should not at first be covered by more than about 2in. of soil, as the young plants are liable to be smothered and retarded if they are deeply covered before they have become established and are sufficiently strengthened. The crowns should be planted 18in. apart in either single or double rows, but the bed for a double row should be not less than 42in. wide.

If the soil is lacking in plant food and natural organic manure is not available, a dressing of blood and bone at the rate of 3oz. to the square yard will give good results. This can be applied annually as soon as cutting ceases by broadcasting it over the bed and carefully working it in, afterward lightly topdressing the whole with soil.

Asparagus grows well in a wide range of soils, but excellent results can be expected in well-drained, free-working loams. The popular belief that salt is essential is not borne out by most commercial experience, though the plant is known to be tolerant of it. To give the plants a chance to become strongly established no cutting should be done until the third year from planting, and then only a very light one, especially where one-year-old crowns have been planted; where two-year-old crowns have been planted and growth has been strong a light cutting may usually be made the second year. Excessive cutting early in the life of the beds tends to weaken the plants, and for the best ultimate results strengthening of the crowns should be the chief aim.

Broad Beans

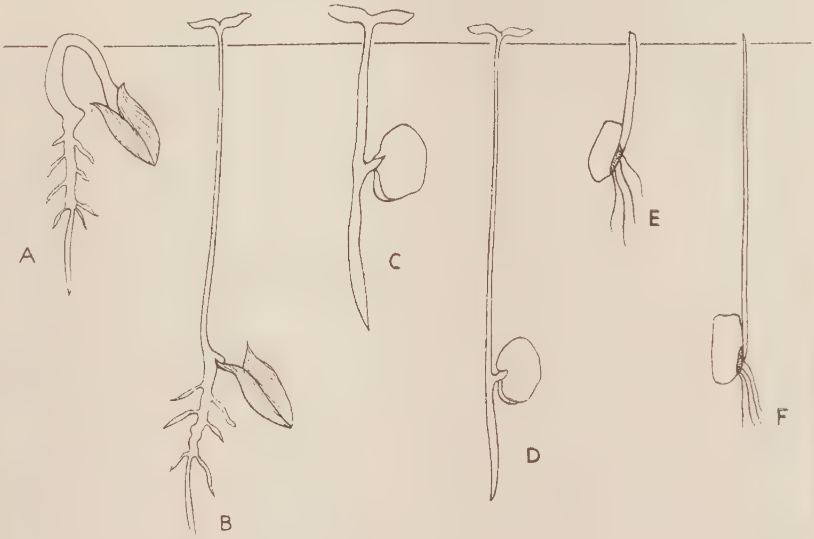
It is not too late to make a sowing of broad beans. The soil should be deeply dug and fairly well supplied with organic material such as compost or stable or farmyard manure; if additional plant food is required, a dressing of up to 3oz. of superphosphate to the square yard should give good results. Beans should be sown in double rows with the seed zigzagged 4 to 6in. apart and 2in. deep, preferably in the bottom of a trench 3in. deep. One quart of seed will sow 60 to 100ft. of single row.

Good varieties are Early Long Pod and Broad Windsor.

Onions

In most North Island districts autumn-sown onions can now be set out as advised in last month's "Journal." Where seed is sown in spring, as it is in most southern districts, sowing should be delayed unless weather conditions are favourable and the seed-bed is well drained and can be worked down to a fine, firm tilth. Advice on sowing and preparation of the seed-bed was given in last month's notes.

SEED-SOWING DEPTHS



If seed is planted too deeply, thin, weak shoots which are easily killed under adverse conditions develop. Seedlings shown escaping from their seed coats are: A and B—Pumpkin; C and D—Bean; and E and F—Maize. A, C, and E, planted at suitable depths, are making strong growth. B, D, and F, planted too deeply, show the weakening effect due to depletion of food reserves contained in the seed coat.

Other Species of Onion

Apart from garlic, which has been mentioned earlier, and rocambole (rock onion) and chives, which were mentioned in last month's "Journal," there are several other useful members of the onion family which can be grown in the home garden.

The potato onion (underground onion or multiplier) forms a cluster of small bulbs or offsets after it has developed leaves; they are formed just under the surface and are of mild and pleasant flavour; culture is similar to that of the shallot, but it is advisable to plant earlier.

The Egyptian or tree onion develops a large bulb from which it sends up one or more seed stalks, on the top and sometimes on side branches of which are developed clusters of bulbils a little smaller than those produced by the potato onion and about the size of small marbles; they are used for flavouring and pickling. This vegetable is sometimes confused with the rocambole, but is distinguished from the true rocambole by its tubular leaves. There are two forms of tree onion; one produces aerial bulblets only and the other both aerial and underground bulblets. The base bulb of the form producing only aerial bulbs may be grown in the normal way the first year and, if pinched back the second year, can be induced to grow quite large, though flavour is usually strong and texture rather coarse. The large bulbs do not keep well; culture is similar to that of shallots, except that the bulbs should be planted 3in. deep.

The ciboul, Welsh, or everlasting onion (*Allium fistulosum*) does not form a bulb; the immature sprouts (cibouls) are used as "spring onions." They develop early in the year. There are two varieties, red and white, and both are very hardy, but their strong flavour renders them inferior to spring onions. The ciboul is a perennial, but can be sown annually similarly to onions.

Parsley

To ensure adequate supplies of parsley, seed should be sown twice a year in most gardens—in spring and again in autumn. The plant is a biennial—that is, it goes to seed the second year—but unless conditions are specially favourable, germination is usually slow and unless two sowings are made, there may be a break in supply. It responds well to rich, well-drained soils, and where the soil is lacking in organic matter a dusting of blood and bone lightly forked in at the rate of 2 to 3oz. to the square yard usually gives good results. Seed can be sown in rows or broadcast on a small plot, but for best results the plants should be spaced about a foot apart when at the seedling stage. They make quite a good edging and do well in a cool, moist soil in the open or semi-shade. They are a rich source of vitamins and should be grown by every home gardener who appreciates the flavour. If aphides are troublesome, they can be controlled by spraying with nicotine sulphate at the rate of ½ fl. oz. plus 1oz. of soap to 2 gallons of water.

Varieties: Moss Curled is most popular, but a variety known as Hamburg, which has foliage less fine but an edible root somewhat resembling a slender parsnip in shape and colour, is gaining popularity. The flesh of the root is white and rather dry and the flavour somewhat like that of celeriac. The roots may be used for soups and stews.

Peas

In most southern districts and on heavy, poorly-drained soils or areas not lying favourably to the sun sowing of peas is best delayed for at least another month. Elsewhere a sowing of a dwarf early variety can be made, to be followed where space permits with a successional sowing in two or three weeks' time. A dwarf variety is usually preferable for the first sowing, but tall varieties may be used. Alternatively two or three varieties with successional maturity dates can be sown at about the same time. For early sowings seed should be dressed with a suitable seed protectant, as soil-borne diseases are specially troublesome early in the season when the ground is cold and often inclined to be wet. Seed should be sown as advised in last month's "Journal."

Potatoes

It is too early yet to make any general planting of potatoes, but seed can be purchased and the tubers set to sprout in a box in a light, airy, frost-free shed or outbuilding. Well-sprouted tubers planted shallowly in

[*Green and Hahn Ltd. photo.*

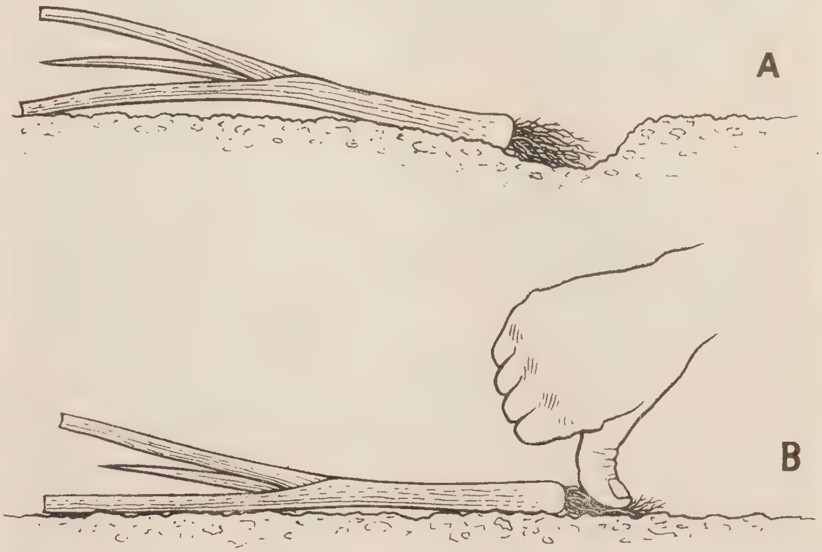
From a large bulb the tree onion sends up one or more seed stalks, on the top of which clusters of bulbils used for flavouring and pickling develop.

well-drained soil in a favourable situation send shoots above ground within two or three weeks, and as frost is likely in many districts until late October and in most southern districts until mid-November, the shoots of tubers planted in August are likely to be destroyed unless continuously earthed up. Very early planting does not always result in correspondingly early maturity. If very early-planted tubers are set deeply, they usually respond slowly because of the colder ground temperatures, and if planted shallowly, they must be regularly earthed up to prevent frost damage. Though a severe frosting of the tops kills young plants only rarely, it invariably reduces their yield. Earthing up protects the tops from frost, but normal development is impossible unless the plant is enabled to develop green leaves with which in the presence of light it manufactures sugar, which it builds up into starches and other substances. The advantage of early planting therefore lies mainly in the development of the underground system, which, even if only of moderate size, forms an excellent basis for development when frost danger is past.

If the tuber moth is likely to be troublesome, tubers set to sprout should be dusted with hydrated lime, arsenate of lead, or an insecticide such as that containing rotenone.

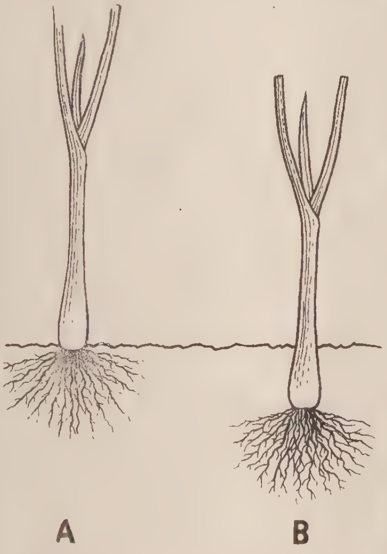
Because of its freedom from disease, Government Certified seed is usually preferable, but in districts where disease is not specially troublesome and large Certified seed is difficult to get some home gardeners prefer to use medium or large tubers saved from a disease-free crop for early planting, because experience has shown that large tubers usually produce much stronger plants earlier than small tubers.

TRANSPLANTING AUTUMN-SOWN ONIONS



The plant may be set in a shallow trench, as in method A. If the roots are covered they will quickly pull the plant into an upright position. The same result may be achieved by pressing the roots into the soil with the thumb or finger, as in method B.

TRANSPLANTING AUTUMN-SOWN ONIONS



The leaves of the seedlings have been trimmed for transplanting. A shows the correct depth, which may appear shallow, but under favourable conditions the roots quickly contract and pull the plant into position. The too-deep planting shown in B will cause thick-necked or irregular-shaped bulbs to be produced.

If the tubers are to be cut, at least two eyes should be left on each section and planting should be done immediately after cutting.

Good, well-tried varieties for early planting are Epicure and Arran Banner, but there are other good varieties well suited to specific locations, and where space permits it is a good plan to try out several different varieties. Early potatoes can be set 10 to 15in. apart in the bottom of trenches 4 to 5in. deep and 24in. apart.

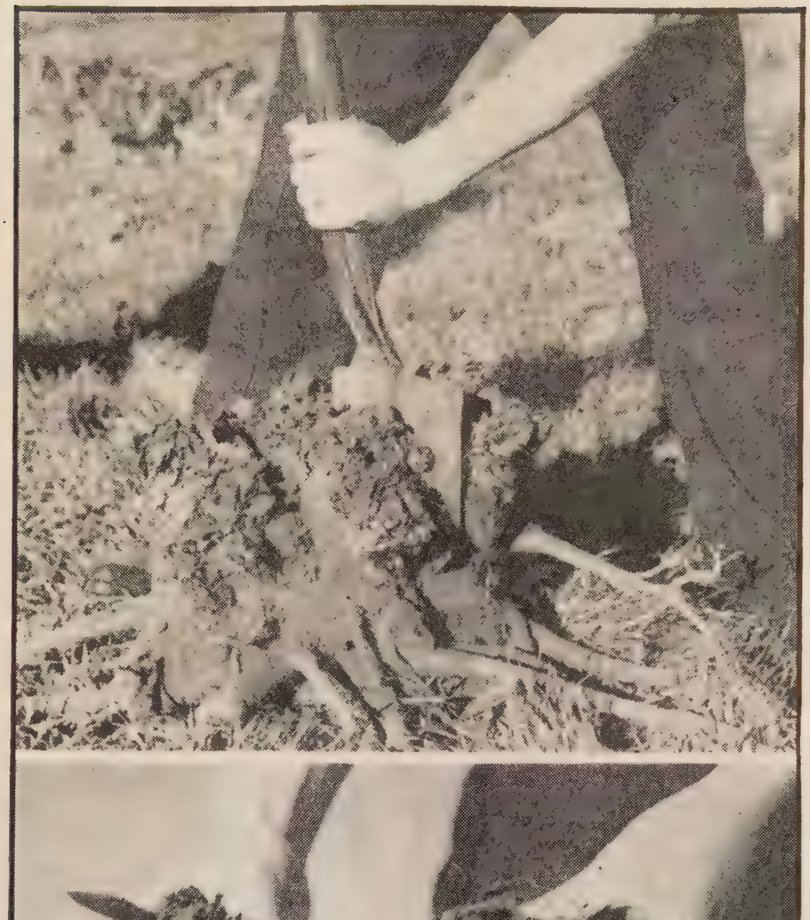
Rhubarb

In most districts main-crop rhubarb will now be showing signs of growth. The buds on the root stock or crown first enlarge and then the new growth bursts forth. If a new bed is to be planted or the crowns in an old one broken up, no time should be lost. Rhubarb is a hardy plant that will stand a great deal of abuse, but for best results the crowns should be planted before growth has developed beyond the stage where the buds can be clearly distinguished but have not burst. It is advisable to await this stage so that the splitting of the crowns—usually best accomplished with a sharp spade—can be efficiently done. Only one or two buds should be left on each section of the crown to be planted. Replanting should in most cases be done about every four years, but variety, soil, and situation all play their part, and in some instances beds will continue to produce good stalks for up to 10 years. If, however, the stalks become thin, weak, and very numerous, it will usually be found that the crown has become hollow in the centre; it should be dug up as soon as dormant and split and replanted as advised above.

When crowns are replanted the tops should be covered with soil to a depth of about 1in. The soil should be rich in organic matter such as stable or farmyard manure, compost, or rotted stack bottom. Where strong crowns have been planted in well-drained soil over-manuring is unlikely under the conditions ruling in most home gardens, as rhubarb is a rank-growing plant and responds especially well to a rich soil. If natural organic manure is not available, a liberal handful of blood and bone mixed into the soil around each crown will usually give good results.

Good drainage is important and the site of a new bed should be trenched or deeply dug and perennial weeds such as couch grass, oxalis, or convolvulus removed and if necessary the area drained by field pipes or by the deep burial of open stony material to form a moraine drain. Because it is a perennial, rhubarb is frequently planted at the end of a garden where its presence will not interfere with the digging over of the garden plot, and it is often at a boundary fence that couch or convolvulus is most troublesome. Whether rhubarb is to be planted or not, August is a good time to dig along boundary fences and to remove all perennial weeds.

THE HOME GARDEN IN AUGUST



[*Green and Hahn Ltd. photos.*

Upper—Splitting a rhubarb crown. Lower—Sections of a rhubarb crown showing large buds, each of which, with a piece of root, is capable of developing into a plant.

Unless rhubarb has made exceptionally good growth, no stalks should be pulled the first year; even in the second year discretion should be exercised, as the pulling of stalks is exhausting to the plant and future development is likely to be seriously affected by too heavy pulling.

There are many good varieties of rhubarb on the market and a selection may be made of early, main-crop, and ever-bearing varieties. For very small gardens an ever-bearing variety is probably preferable, but where space permits and if rhubarb is a popular article of diet in the home, all three kinds should be planted. As stocks of varieties sold are often variable, it is advisable where possible to choose a variety the quality and vigour of which are known to be good.

Root Crops

Where soil conditions are favourable small successional sowings of carrots and turnips and in southern districts an early sowing of parsnips should be made. The soil should be rich in well-rotted organic material such as compost; land heavily manured for a previous crop is excellent. Cultivation should be deep and thorough and good drainage is essential; carrots and turnips should be grown quickly if succulence and crispness are required. If additional fertiliser is necessary, superphosphate at 1 to 2oz. a square yard is recommended. Varieties were mentioned in last month's "Journal."

Salad Vegetables

Largely because they are eaten raw, salad vegetables are almost without exception a very good source of vitamins. In the well-planned garden an adequate supply should be available for as long a period each year as weather conditions permit. The list of plants used in salads includes beet, celery, chicory, chives, cress, cucumber, endive, lettuce, mustard, nasturtium, onion, shallot, and tomato.

Lettuce, radish, and spring onions: If ground conditions are favourable, small successional sowings of lettuce, radish, and spring onions may be made. These vegetables remain in the best condition for only a limited time and should be used when young and fresh. A well-drained, deeply cultivated soil rich in humus is necessary, as quick, vigorous growth is essential for crisp, succulent produce. The soil for lettuce in particular should be well supplied with nitrogenous manure; dried blood, blood and bone, or poultry manure is excellent. Seed of radish, spring onion, and lettuce should be sown thinly ¼ to ½in. deep in rows 12in. apart. When well through the ground the lettuce can be thinned to 8in. apart. Alternatively lettuce may be sown in boxes in a frame and planted out when 2 or 3in. high.

Good varieties for sowing or planting now are: Lettuce: Neapolitan, Imperial 615, Imperial D. Radish: French Breakfast, Long Scarlet. Spring onion: White Portugal, Odourless.

Sea Kale (Crambe maritima)

Though sea kale is grown in relatively few home gardens in New Zealand, a number of experienced or discerning gardeners grow it. Its delicious flavour is preferred by many to that of asparagus. The usual method of starting a plantation is to buy well-grown roots, which are stocked by many good seedsmen, and to plant them 18in. apart in rows 2ft. apart in richly-manured, deeply-dug soil in August or in southern districts in September. Roots may, however, be planted in autumn or winter if the soil is well drained and the situation favourable. To prevent flowering the pointed buds on the crown of each root should be cut off before planting. If the buds are not cut off, flower stems usually develop and must be removed.

The crown of each root should be 2in. below soil level; if planted level with the surface, it should be covered with 2in. of soil. During the season growth should be encouraged by liberal applications of liquid manure and the plant should not become dry.

In autumn when the leaves die down they should be removed and in June the roots should be covered with large inverted flower pots or boxes which do not admit light; if an apple case is used, it is advisable to cover it with good insulating material such as straw or sacking or both. Soil should be drawn against the edges of the box where it touches the ground to keep the temperature even and to exclude light and so produce a delicate sample. Sea kale, which is usually bitter if grown in light, differs from rhubarb, which may be forced in somewhat similar manner. In districts which experience a very mild winter it is sometimes difficult to produce a fine-flavoured sample, as if the temperature under the box exceeds 55 to 60 degrees F. for any considerable time, the shoots usually become thin and wiry. The boxes should be removed from time to time to observe growth, and when the shoots are ready they should be cut, together with a small portion of the crown. When all the growth is taken the box should be removed and the crown covered for protection with a thin layer of soil. Flower stems must be removed and only two or three of the strongest shoots left, but the soil is rich and well-manured, a sea kale bed will last for years.

Sea kale can be grown from root cuttings or from seed sown in drills 12in. apart in September or October; seedlings should be thinned early to 6in. apart and the plants set out in their permanent positions in August or, if the situation is favourable, during late autumn or winter.

Shallots (Eshalots)

A common rule for the culture of shallots is to plant on the shortest and to harvest on the longest day. The shallot is a particularly hardy vegetable and because it is planted out as a small bulb, it is better adapted to stand rigorous conditions than plants of closely-allied families which are grown from seed, but planting on the shortest day is of little advantage if growing conditions are unfavourable. Bulbs should be graded to size and planted 8in. apart in rows 12in. apart; each bulb should be pressed firmly just sufficiently far into the soil to keep it in position. Culture and soil requirements are similar to those of the onion.

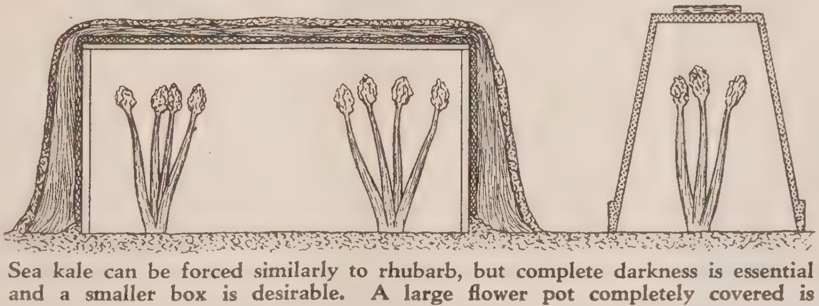
Silver Beet (Swiss Chard or Sea-kale Beet), Spinach Beet

There have been some very fine strains of silver beet produced in recent years, and the large but tender and succulent midribs of some strains, if properly prepared for the table, are not unlike sea kale in flavour. In New Zealand the plant is grown mainly for its green leaves, which are a rich source of vitamins. Spinach beet is a closely-allied plant the leaves of which are used after the manner of spinach. It can, however, be harvested for very much longer than spinach, and once established it is much more tolerant of adverse conditions such as dryness and extreme temperature changes.

All the above plants do well in conditions which suit lettuce. The soil should be well drained and rich in organic manure, and cultivation should be deep and thorough. Where conditions are favourable seed can now be sown in rows 15in. apart in the open ground and the young plants later thinned to 8in. apart in the rows. Soil lacking in plant food can be improved by a dressing of blood and bone forked in along the proposed line of row. Where soil drainage is poor or the aspect unfavourable seed is best sown thinly in a seed-box of prepared soil and the plants grown on in a frame until ready for hardening off preparatory to setting out later.

Good varieties are: Silver beet: Lucullus, Dark Green Broad Ribbed. Spinach beet: Perpetual Spinach, Spinach Beet.

FORCING SEA KALE



Sea kale can be forced similarly to rhubarb, but complete darkness is essential and a smaller box is desirable. A large flower pot completely covered is excellent. For maintaining even temperatures straw or soil should be placed over the box and if necessary held in place with sacking.

Standing and Stored Crops

In most districts only the latest varieties of savoy cabbage are now standing and by the end of the month reliance will have to be placed on spring cabbage or winter cauliflower or broccoli. It is advisable, therefore, to protect the developing curds of winter cauliflower by breaking a leaf or two over the heads of those that are nearly mature, and if spring cabbage is developing too slowly, to give liquid manure liberally. A weekly application of liquid manure made by soaking a small bag of farmyard manure in a large container of water will usually prove of great benefit. This is a safe manure and is particularly suited to crops such as cabbage, lettuce, and silver beet, which thrive in a rich soil. If organic manure is not available, nitrate of soda or sulphate of ammonia may be applied weekly at the rate of 1oz. to 2 gallons of water. At this time of the year the soil in most gardens tends to consolidate and water lying on the top inch or two acts as a seal which prevents the free movement of air to the roots of the plants. This results in lower temperatures and slower growth. Where space permits, therefore, and provided the roots are not injured, the soil should be loosened by forking lightly or cultivating with a Canterbury type of hoe or tined cultivator.

Most root crops will by now be making second growth and efforts should be made to retard them so that they will not dissipate their substance in the production of seed. Unless crops such as carrots, parsnips, and beet are soon to be used, they should be lifted and stored in damp sand, clean, coarse coal ashes, or soil in a coal cellar or outhouse or in a box plunged in the ground in a shady part of the garden.

Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

August 2—"Current Farm Problems," by E. B. Glanville, Assistant Fields Superintendent, Auckland, and H. Woodyear-Smith.

August 9—"Control of Pests and Diseases in the Home Orchard," by I. L. Nottage, Orchard Instructor, Auckland.

August 16—"Sweet Blue Lupins," by K. M. Montgomery, Fields Instructor, Te Kuiti.

August 23—Young Farmers' Clubs session, by a member of the Te Kuiti district committee.

August 30—"Research Work with the Farmer," by P. B. Lynch, Crop Experimentalist, Wellington.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.35 p.m. and Thursdays at 7.15 p.m.

Farm news sessions are broadcast over main national stations every Thursday at 9.20 p.m.

CARE OF LIVESTOCK DURING AUGUST

Contributed by the Animal Research Division.

WORMS IN HORSES

RED worm infestation reduces the efficiency of farm horses. Drenching with phenothiazine now will prevent pastures becoming contaminated with eggs and thus reduce the chances of re-infestation in spring. As phenothiazine causes very severe reactions in some horses, dosing should be done under veterinary supervision wherever possible; if this cannot be arranged, the dose recommended on the package should be divided into 5 parts and given over 5 days.

* * *

SCOURS IN YOUNG CALVES

To prevent deaths from scours in young calves they must receive special care during the first few days after birth. Make sure that they get their mother's milk for at least 3 days. Do not over-feed; half a gallon of milk a day is enough for the first week. See that buckets and pens are cleaned regularly. If scours do occur, veterinary advice should be sought early, as sulphaguanadine, which can be obtained only on veterinary prescription, is one of the few effective remedies.

* * *

ARTHRITIS IN LAMBS

Lameness and loss of condition often result from arthritis due to an infection which may gain entrance through marking wounds. To avoid this always mark in temporary yards erected on clean pasture and disinfect instruments frequently. These precautions are necessary even if a bloodless method of marking is used.

[*Sparrow Industrial Pictures Ltd. photo.*

SCABBY MOUTH OF SHEEP

Scabby mouth is caused by a virus which gains entry through small scratches. It causes sores and scabs on the lips and face and occasionally on the legs of lambs and older sheep and sometimes affects the udders of ewes. Complete protection can be provided by vaccinating the lambs at marking time. The vaccine is provided free by the Animal Research Station, Wallaceville, and can be obtained with full instructions for use through any Veterinarian or Inspector of Stock.

* * *

DISEASES OF POULTRY

Navel disease is contracted in the incubator, which should be scrupulously cleaned and fumigated with formalin between hatchings of batches of chicks. The local Poultry Instructor should be consulted for further advice. Pullorum disease can be controlled only by repeated blood testing of all stock, immediate disposal of all reactors, and thorough cleaning and disinfection of premises after each test.

* * *

LICE ON CALVES

Calves and yearlings may become very lousy during late winter and early spring. Control can be effected by the use of suitable dips, sprays, or washes. Those containing D.D.T. and "gammexane" are most effective. Repeated treatments may be necessary, as the eggs are difficult to destroy.

Avoiding Losses in the Chick-rearing Season

THE chick-rearing season has started for New Zealand poultry farmers. It is perhaps the most important period of the year, and certainly it is a most strenuous and anxious time. Much depends on successful rearing; a bad season may have repercussions for at least the next two years. In this article F. C. Bobby, Superintendent, Poultry Industry, Wellington, reviews some of the fundamental principles of chick rearing.

[*National Publicity Studios photo.*

BREEDING pens will have been completed and mated up before now, but unnecessary wastage among hatching eggs from infertile eggs and dead-in-shell may be avoided by a careful checking of the breeding birds. Care must be taken that the condition of male birds is retained, while it is equally important to ensure that the dams are not too fat. Cockerels out of condition can cause heavy infertility. A common practice among experienced poultrymen is to train either individual males or teams of male birds to feed by themselves outside the laying house. That calls for patience and some extra time when feeding the birds, but it pays good dividends in the form of fertile eggs and later strong germs in the incubator.

Hens which are too fat at the start of the hatching season or become fat as the season progresses often lay badly-shaped eggs or eggs with poor shells. Such eggs are usually discarded, but if placed in the incubator, they have low hatchability. Quite often the poultry producer looks for mistakes in the management of his incubator, whereas the trouble is in the breeding pen. It is natural to pay close attention to the incubator or the brooder pens, but it is all too easy to overlook the breeding birds.

Danger of Overcrowding

Most poultry farmers commit the error of overcrowding chicks at some stage in rearing. Though recognised as a cardinal fault and one for which the producer will pay ultimately, it is still committed from time to time even by experienced rearers; for the novice or comparative novice it is a pitfall.

Overcrowding at any age is certain to have an adverse effect on the birds. In their first week or so the chicks may appear to have ample room, but they grow quickly, often becoming overcrowded at four to five weeks, and the fact is overlooked until the very appearance of the birds indicates only too clearly that they have suffered a check. In the busy season this can happen easily.

Chickens up to the age of five to six weeks require ½ square foot of floor space a bird or 50 square feet for each 100 chicks. Chicks should also be allowed about 8 square inches of floor space under the hover; a 42in. diameter hover is suitable for a maximum of 200 chicks and one of 52in. diameter for 300 chicks. Though these figures appear to give a surplus of room for day-old chicks, and even for chicks a fortnight old, the area quoted for floor space is the minimum necessary for birds between three and five weeks of age. Any smaller area would result in overcrowding.

The importance of maintaining a dry floor and litter for chickens must not be overlooked. Damp, dirty litter provides excellent conditions for the development and spread of coccidiosis—the caecal (blind gut) form common in chickens between the ages of three and eight weeks. A clean and dry floor (including litter) is the best insurance against this destructive disease. Water spilled from drinking fountains, rain driven in through the front of the house, and overcrowding are all causes of damp and dirty brooder house floors.

Dampness Under the Brooder

Another condition to be feared is dampness under the brooder, which is invariably caused by insufficient ventilation and sweating among the chickens. Such sweating and dampness check the growth of the birds and cause unevenness in size and loose feathering.

The use of wire-netting floors to improve ventilation under the brooders and to prevent sweating among the chickens is now common, but the best method of operating these wire floors is still controversial. Because chickens do not settle easily on wire-netting, and because with only a wire-netting floor for day-olds it is more difficult to maintain an adequate temperature under the brooder, poultry producers often cover the netting frames with a sack on which is put a covering of litter. If this sack were retained on the frames for only 10 days to a fortnight and the litter changed daily after the first week, little harm would accrue. Unfortunately sacks are often retained for much longer, and sweating results. The value of the wire frames as a means of giving additional ventilation is lost when they are covered with sacking and litter; obviously no appreciable quantity of air can then permeate beneath the birds sleeping under the brooder at night.

When the suggestion is made that the sacking should be removed gradually after the chicks reach 10 days of age, producers frequently complain that trouble is experienced in getting the birds to go up on to the frames at night. It is claimed that the wire-netting is uncomfortable for the chickens to settle on.

From experience at the Department's poultry plant at Upper Hutt the following method of avoiding these troubles can be recommended: When a brooder is being set up, and before it is filled with chickens, the space between the wire-netting on the frame and the floor should be completely filled with chopped straw. If the day-old chicks are put straight on the netting, they experience no trouble in

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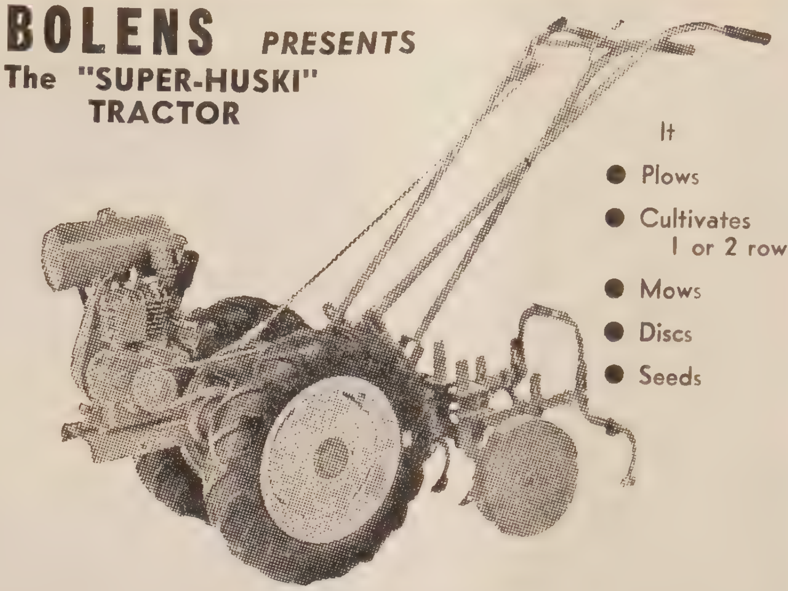

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getting used to settling on it. The litter fills up the mesh of the netting and there is no discomfort to their feet or danger of their hocks catching in the netting, though they are sitting on wire. In addition, the litter under the netting permits a desirable temperature to be maintained under the hover without difficulty. On the third or fourth day the chicks should be chased off the netting, the frames lifted, and the litter pushed out over the pen floor. As the chickens have already become used to sitting on netting, they will go back on to the frames without any trouble. For the remainder of the brooding period there is increased ventilation and no danger from sweating or damp litter under the hover. When the chickens are about three weeks old the wire floor is raised on blocks to ensure still further ventilation at a time when fresh air under the hover is so essential. If the brooder is fitted with an efficient and adequate electric unit, there will be ample heat for the chicks on the bare wire-netting floor after four days in the brooder. The maximum temperature under the brooder is required only for the first two or three days until the chicks have learnt to feed and exercise themselves. This method of using a wire floor is an excellent way of effecting the first reduction in temperature under the brooder.

Though other aspects of brooder management are important, those described are fundamental and apply to almost all types of brooding equipment in common use. If attention is paid to these alone, much will have been done to ensure satisfactory chick rearing this season.

If a poultry keeper experiences an outbreak of trouble among his chickens this year, he should get in touch immediately with the Poultry Instructor for the district. Assistance may be obtained from Departmental poultry officers by writing or telephoning to the Department of Agriculture in Auckland, Palmerston North, Hastings, Wellington, Christchurch, Oamaru, or Dunedin.

Testing for Pullorum Disease

The Department started a campaign of blood testing breeding stock as a means of controlling pullorum disease in young chicks in 1941. So successful has this campaign been that the work associated with testing breeding flocks has now become a major operation each year and something of a problem.

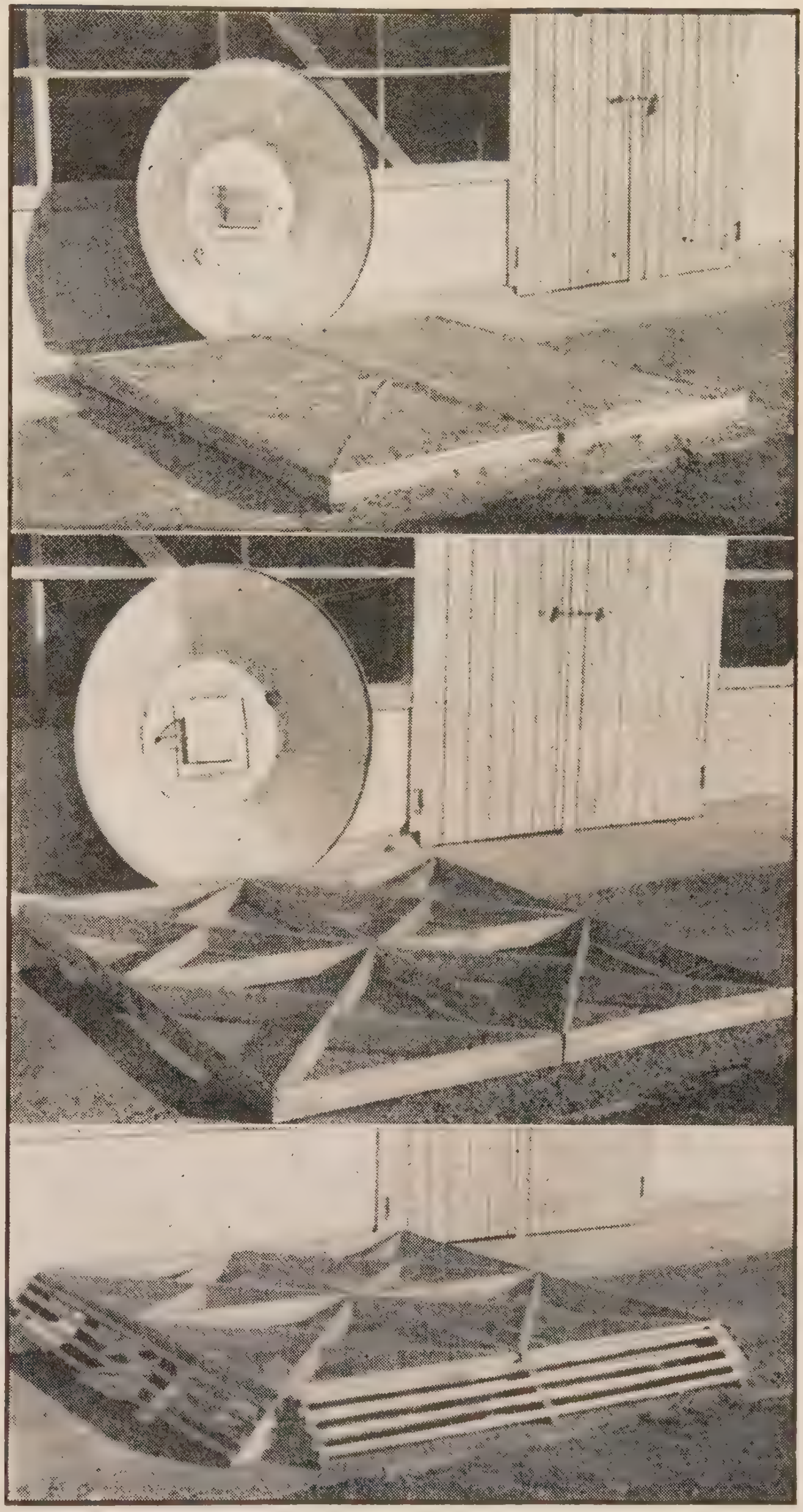
Flocks tested in 1947 numbered 21 more than in the previous year. There was a drop in the Wellington area (which includes Taranaki, Gisborne, Hawke's Bay, Manawatu, Blenheim, and Nelson), but increases in all other areas; that indicates that more than 21 new flocks were tested.

Number of Farms where Birds were Tested

	1942	1943	1944	1945	1946	1947
Auckland ..	10	5	15	68	88	91
Wellington ..	9	11	82	163	193	175
Canterbury-Westland	1	—	—	20	45	57
Otago-Southland	—	—	—	21	41	65
Dominion	20	16	97	272	'367	388

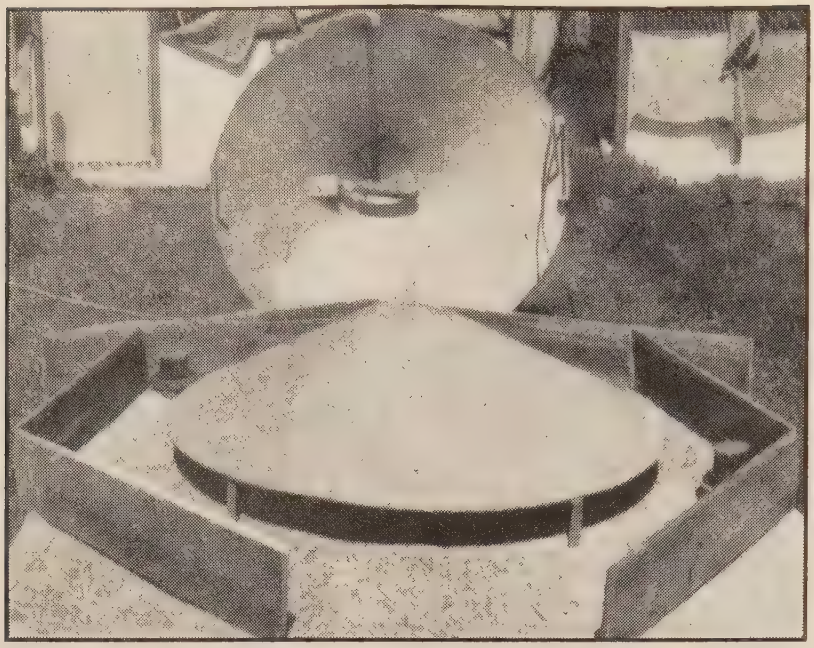
The number of birds tested increased by 20,405, the largest increases

WIRE FRAMES FOR BROODING CHICKENS



The three stages of rearing. Upper—Litter under the wire-netting. Middle—No litter under the wire-netting. Lower—The frame raised to give increased ventilation.

AVOIDING LOSSES IN CHICK REARING



[*Green and Hahn Ltd. photo.*

A wire frame used with a sack and straw litter.

Total Number of Birds Tested

	1942	1943	1944	1945	1946	1947
Auckland	11,478	2,627	12,253	25,449	33,931	42,095
Wellington	4,726	6,941	34,515	61,453	65,075	66,148
Canterbury-Westland ..	544	—	—	11,589	13,690	22,199
Otago-Southland ..	215	—	—	11,131	19,957	22,616
Dominion	16,963	9,568	46,768	109,622	132,653	153,058

being in the figures for Auckland and Canterbury (see table above).

In 1941 the Department was responsible for testing only 684 birds.

Number of Reactors

The 1947 results showed 6.8 per cent. of reactors, about the same as in 1946. The figures will vary a little year by year, but it is significant that many poultry producers have experienced less brooding mortality and are completely satisfied that blood testing has assisted them.

Dominion Totals of Birds Tested and Reactors

	Birds tested	Number of reactors	Percentage of reactors
1942 ..	16,963	1,970	11.6
1943 ..	9,568	629	6.6
1944 ..	47,768	5,711	11.9
1945 ..	109,622	9,888	9.0
1946 ..	132,653	8,737	6.6
1947 ..	153,058	10,426	6.8

Blood testing has thrown a heavy volume of work on the Poultry Instructors in all districts, and individual producers may not be able to have their birds tested at the time most convenient to themselves. In fact, a complete review of the administration of the present blood-testing policy will be necessary this year.

◆

Fertiliser Delivered in Waikato by Special Weekend Trains

A TOTAL of more than 2750 tons of extra fertiliser was delivered in the Waikato in May by the running of special weekend trains made up of trucks that would normally not be available for this work in the weekend. The use of the special trains enabled fertiliser which had accumulated at the three fertiliser works in Auckland and which could not be transported by normal services to be made available to farmers in the Waikato, who required it urgently.

The scheme to run special weekend trains was first suggested to the Aid for Britain National Council by Federated Farmers. The Railways Department agreed to make a train available on the understanding that the wagons from that train would be on hand to continue their normal coal carrying and other essential functions in the Waikato on Monday morning. The Labour and Employment Department, Railways Department, Department of Agriculture, and the Transport Department in Auckland co-operated with the three fertiliser works' managers, workers' union officials, and Waikato carriers, and the first special train was loaded on May 7 and unloaded on May 9 at Te Kuiti, Otorohanga, and Hangatiki. Trips in subsequent weekends were made to Putaruru and to Te Kuiti and Otorohanga.

"This is an excellent example of what can be done with co-operation in a wholehearted manner," said Mr. F. P. Walsh, chairman of the Aid for Britain National Council. "Such action if adopted by other sections of workers and employers would assist the campaign to aid Britain."

SUDDEN DEATH OF MR. R. A. CALDER

THE sudden death at the age of 44 of Mr. R. A. Calder, Director of the Agronomy Division of the Department of Scientific and Industrial Research, occurred at Lincoln recently.

MR. CALDER joined the Department of Agriculture in 1926, and after serving in Christchurch he was appointed the first Instructor in Agriculture in South Canterbury. After a period of study overseas he became Assistant Agronomist at the Plant Research Station at Palmerston North. When the station was subdivided he remained with the Agronomy Division under the Department of Scientific and Industrial Research, transferring with that division to Lincoln in 1937. He was appointed in turn Plant Breeder, Assistant Director, and Director.

Mr. Calder was a Bachelor of Agriculture and a Bachelor of Science. His studies abroad were mainly undertaken at the Aberystwyth Plant Breeding Station under the guidance of Professor Stapledon. He also made a comprehensive investigation of plant breeding institutions in Great Britain, Europe, and the United States.

He devoted his efforts almost entirely to crop improvement, in which he played a leading part in New Zealand. In association with others he developed an improved strain of lucerne and several new varieties of field and garden peas, and initiated improvement in oats and barley. His particular interest was in the development of brassica crops. He bred several new types of rape which are widely grown today, improved marrow-stem and thousand-headed kale, and successfully bred a new variety of swede adapted to dry land.

Despite innumerable difficulties and shortage of staff during the war, Mr. Calder as Acting Director of the Agronomy Division maintained a very high standard of work, and pure-seed production developed to a stage where the demand far exceeded the production capacity of the division.

His achievements in these and many other directions will remain a permanent memorial of his life's work, but those who knew him will also remember his sincerity of purpose, his unfailing good will, and his likeable character. His death has come only a few months after his appointment as Director of the division and at a time when his wide experience and mature judgment would have been most valuable to the full development of the division.

◆

Removal of Hormone Weedkiller Residues from Spray Equipment

By R. M. GREENWOOD,
Plant Chemistry Laboratory, Department of Scientific and Industrial Research, Palmerston North.

A NUMBER of horticultural plants, particularly tomatoes, are sensitive to minute quantities of 2-4-D (2-4-dichlorophenoxyacetic acid), the active ingredient in many of the new hormone weedkillers. After these weedkiller sprays have been used thorough rinsing of the spray equipment with water is not sufficient to remove all traces of the chemical, and sensitive plants, if sprayed later from the same equipment, may be severely damaged.

[*Sparrow Industrial Pictures Ltd. photo.*

THE type of damage on tomatoes was described by J. D. Atkinson in an article in the "Journal" of October, 1947. The amount of damage depends considerably on the age and vigour of growth of the plants when sprayed, young and actively-growing plants being much more sensitive. This difference in effect is shown in Fig. 1; both plants were given the same treatment, but the plant on the right was younger and growing much more vigorously when sprayed. Plants under glass are more sensitive than those growing outside. A somewhat higher concentration of 2-4-D than that used on the plants shown in Fig. 1 causes growth to stop, as in Fig. 2. Before this plant was sprayed the pump, which had been contaminated with 2-4-D, was washed thoroughly four times with water. After a considerable period such plants may resume growth. Traces of 2-4-D also have the effect of setting fruit, both from flowers which have faded but failed to set (Fig. 2) and from buds which have not yet come out. Such fruit are seedless, but are sometimes hollow.

On tomatoes 4-chloro-2-methylphenoxyacetic acid (commonly called methoxone), when used at low concentrations, has been found to show about one-tenth of the effect of 2-4-D at equivalent concentration, despite the fact that the two chemicals at weedkiller strength are about equally effective on many weeds. This difference in effect may not apply to other sensitive plants.

Cleaning of Equipment

The difficulty of removing 2-4-D spray residues from equipment was noted by Atkinson, and a number of workers in the U.S.A. have also observed this difficulty. Such cleaning agents as soapy water, dilute ammonia, soda, sodium phosphate, kerosene, and activated charcoal have been recommended alone or in combination. The difficulty of cleaning is shown by a statement by Sylvester and Bakke (1) referring to the cleaning of farm sprayers. These authors, after advocating a three-day cleaning programme using kerosene, soapy water, and dilute ammonia, state: "After you have done all this, spray some tomato plants for a test. If they show any damage, repeat the rinsing process."

For the experiments described in this article a knapsack spray pump was used. The pump was several years old and the inner metal surfaces were dull and somewhat corroded. Small all-metal pumps with bright surfaces may be found easier to clean.

Water-soluble Chemicals

In all cases it was found best to wash the pump free of spray liquid before any special cleaning agent was added. Three thorough water washes were sufficient for that, care being taken with each wash that the water came in contact with all inner surfaces of the equipment. After each washing the equipment was thoroughly drained, and after treatment with the special cleaning agent two further water washes were given before trial sprayings on tomatoes were carried out.

Using that washing procedure it was found that, where the weedkiller used contained 2-4-D in the form of a water-soluble salt, spray residues could be removed by leaving the equipment overnight filled with a hot solution of some alkaline cleaning agent, such as soap and washing soda or dilute ammonia.

Oil-soluble Chemicals

However, with weedkillers in which 2-4-D or a derivative is dissolved in oil, and which form emulsions when added to water, the method just described proved insufficient. The greater part of the residual contamination was located in the rubber parts of the pump. A surprisingly-large quantity of oil-soluble 2-4-D residues could be extracted from the two old washers in the pump. Some contamination also remained on the metal surfaces, that being confirmed by Johnson (2), who found that toxic residues may remain in metal equipment after successive washings with hot water and soap and strong alkali.

The only method of cleaning giving any success involved leaving the whole equipment for 24 hours or more filled with a 1 per cent. suspension of activated charcoal. As the charcoal settled out when standing, the liquid was agitated occasionally. After this treatment of the pump, water sprayed on tomatoes caused no ill effects. However, when some water was left in the pump for a week and then sprayed on tomatoes, the water which had been in contact with the rubber parts caused definite distortions of growth of the plants. Thus it appears that the activated charcoal removed from the rubber only that portion of the dissolved 2-4-D which was close to the surface. This slow release of 2-4-D after cleaning may also occur where pitch has been used for sealing joints in the equipment. With wooden containers a similar effect might be

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1. Sylvester, E. P., and Bakke, A. L. (1947), "Iowa Farm Science," Volume 2, No. 6, pages 7-9.

2. Johnson, E. M. (1947), "Phytopathology," Volume 37, pages 367-71.

expected to occur when using water-soluble 2-4-D salts.

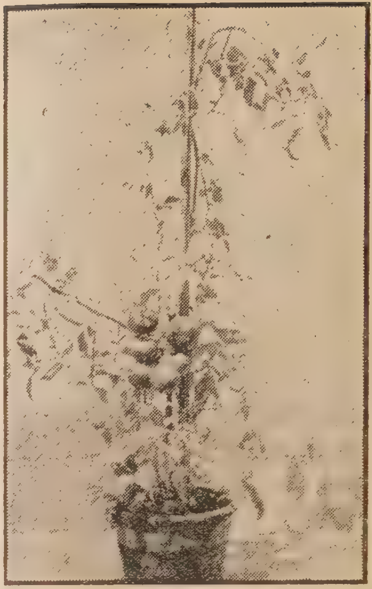
After the use of a weedkiller containing 4-chloro-2-methylphenoxyacetic acid thorough washing with water five times was found sufficient when spraying tomatoes.

Recommendations

If the weedkiller used is water soluble, the equipment should first be washed thoroughly with several changes of water, the wash water being pumped through the entire apparatus. It should then be filled with an alkaline cleaning solution, preferably hot—soapy water containing 1 per cent. of household ammonia (about 2 tablespoons to the gallon) is recommended—agitated, and left over night. This solution is then washed out thoroughly. One per cent. activated charcoal (about 1½oz. to the gallon) may be used in place of the soap and ammonia. Another water wash immediately before use is a precaution in all cases. If the equipment includes a wooden tank, a separate tank for use with weedkillers is advised; if that is not possible, an activated charcoal treatment just before use for spraying sensitive plants should be sufficient.

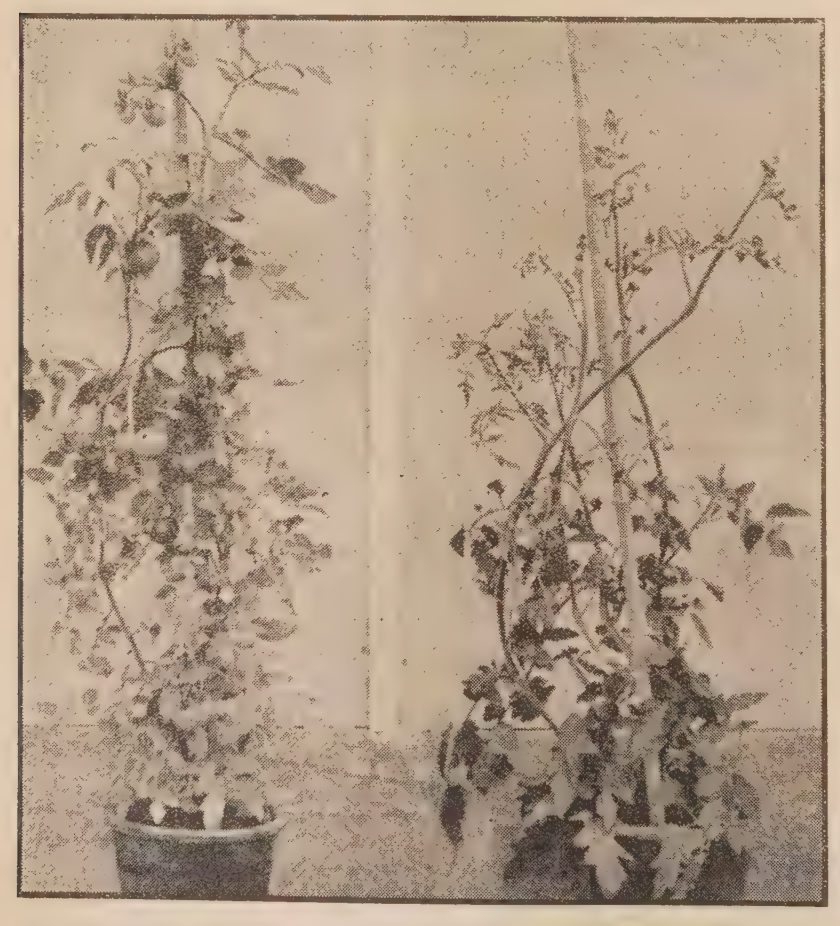
If an oil-based weedkiller is used, the safest procedure is to keep a separate spray apparatus for weedkilling alone. However, if it is desired to use one apparatus both for weedkilling and for spraying sensitive plants, the cleaning programme which follows should prove sufficient. It is important that contamination should be kept to a minimum. To this end the unemulsified weedkiller should not be allowed to come in contact with any part of the equipment, and mixing in a separate container is recommended. The spray emulsion should not be left in the equipment any longer than is necessary.

In cleaning, the entire equipment should first be well washed with water. A preliminary wash with kerosene has been advocated and may be used instead, followed by two washes with warm soapy water to remove the kerosene. The entire equipment should then be filled with a 1 per cent. suspension of activated charcoal and left with occasional agitation for 24 hours or more. After being rinsed the equipment is ready for spraying sensitive plants. However, if any period of time elapses between cleaning and the next spraying, another water rinse should be given immediately before use of the pump.



[*J. L. Mangan photo.*

Fig. 2—A tomato plant severely damaged by 2-4-D residues, photographed two months after being sprayed.



[*J. L. Mangan photo.*

Fig. 1—Differential effect of 2-4-D traces because of different stages of growth of tomato plants. The photograph was taken a month after they had been sprayed.

The following added precautions may be used where applicable:—

1. The addition of about one-tenth per cent. of activated charcoal when Bordeaux mixture is being used to inactivate any slight traces of 2-4-D which might be present. Activated charcoal should not be used with a nicotine spray, as it is likely to reduce the effectiveness of this insecticide.
2. The changing of the rubber parts in the equipment. This is particularly necessary with rubber which has become softened with oil.
3. Another activated charcoal treatment of the equipment just before its use on sensitive plants. This is recommended if a valuable crop is to be sprayed.

For attacking some difficult-to-kill weeds the use of an oil-based weedkiller diluted with kerosene or of some other oil preparations which are not emulsified with water has been advocated. Such sprays will cause greater contamination of the equipment than oil-in-water emulsions, and the use of a special spray outfit is recommended. If it is desired to clean such equipment, it should first be rinsed well with kerosene and then with soapy water, followed by the activated charcoal treatment. The rubber parts should also be changed.

Volatility

Some of the weedkiller preparations are sufficiently volatile to cause damage to sensitive plants nearby. Containers of weedkiller, contaminated pumps, and other such articles should not be stored in glasshouses or close to sensitive plants.

GROWING TULIPS FOR PLEASURE AND PROFIT

THE great capabilities of the Dutch as horticulturists are expressed in the excellence of their bulb products, just as in New Zealand our own national genius seems to be developing along the lines of superb grassland management and the economical conversion of grass into meat and dairy produce. In this second part of his article on tulip culture J. P. Hudson, Horticulturist, Wellington, deals principally with the commercial production of tulips and diseases and pests affecting them.

THERE is little doubt that the Dutch are the best bulb growers in the world. For centuries they have been growing and studying the popular flowering bulbs and exploiting their national assets of climate and soils, and though none of these bulbs is actually a native of Holland, they seem to grow better there than in their own native places.

In the last 30 years big bulb-growing industries have also developed in Britain and America, but New Zealanders can take relatively little advantage of the first-class tulip bulbs now produced in these countries.

As already explained, tulips get "out of step" when taken from one hemisphere to another, and New Zealand-grown bulbs are best for New Zealand gardens, despite all the technical efficiency with which tulip bulbs are grown overseas.

There is an excellent demand within the Dominion (and in Australia) for New Zealand-grown tulips. This demand is only partly satisfied by the present commercial production of bulbs, which is concentrated mainly in Wellington, Canterbury, and Otago Provinces.

Commercial tulip growing overseas is organised into two separate activities—the production of bulbs and the growing of flowers, which before the war were regarded as quite distinct businesses. Bulb growers de-blossomed their plants and did not, as a rule, market any flowers, while flower growers threw away most of their bulbs after they had flowered and bought in a fresh lot each year. This organisation of bulb growing and flower growing as distinct businesses has to some extent been broken down as a result of the war, an effect of which has been to raise prices of cut flowers and the cost of bulbs to previously unheard-of levels.

The two businesses are not normally separated in New Zealand, and flowers are often cut and sold from plants being grown for bulb production. It is not at all certain how far this practice is disadvantageous under New Zealand conditions to the crop of bulbs subsequently lifted, and this is but one of the many matters that need careful investigation if a fully-efficient bulb-growing industry is to be developed. In the absence of reliable data from New Zealand sources, much of the following information is based on overseas experience.

Soil and Situation

Tulips are adaptable to a fairly wide range of soils. The Dutch fields are mainly of light, sandy texture, but have the advantage of a permanent water-table about 2ft. below the surface. Elsewhere heavier silts are used successfully, but in all cases tulips seem to grow best in either recently-deposited or reclaimed, deep, well-drained alluvial soils. The best "finished" bulbs with the cleanest skins are lifted from soils with a relatively-high proportion of sand and a good lime content.

The soils need not, however, be rich for tulip bulb production. In fact, soils of medium fertility seem to be preferred by growers, who often plant tulips after high-fertility-demanding crops such as hyacinths or potatoes without further addition of fertiliser to the soil.

As the size of bulbs lifted seems to depend largely on a high moisture content in the soil, provided it is well drained, it is important to cultivate the soil deeply and work in dressings of cover crop, compost, stack bottom, or any other form of humus that can be procured. An annual dressing of 10 to 15 tons of well-rotted farmyard manure is used to maintain the humus content and water-holding capacity of many bulb fields overseas, though the

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Photograph in heading by Green and Hahn Ltd.

Dutch sands, with their unfailing subterranean water supply, contain relatively little organic matter.

Shelter from winds, adequate drainage, and a cool winter climate are all important for profitable production of tulip bulbs.

Planting on Commercial Scale

Spacing: In Holland, where suitable land is scarce and labour plentiful, bulbs have traditionally been planted close together in beds. Shortage of labour and the urge to mechanise have led to much wider spacing of bulbs by most New Zealand growers.

The Continental system of planting bulbs is in rows 9in. apart in five- or six-row beds with an 18in. path between the beds. The bulbs are spaced the width of one bulb apart, and an acre of tulips planted in this way often holds a quarter of a million bulbs. Bulbs are given rather more room under the British system, and much wider spacings still are the rule in New Zealand, where the rows are often 2ft. or more apart to allow for working by the same machinery used for potatoes. Under the New Zealand planting system about sixty thousand bulbs are accommodated in an acre.

Depth: Overseas experiments have shown that 7in. is too deep for the best production of shapely bulbs, while 3in. is too shallow. A depth of about 4in. to the base of the bulb is about ideal. Bulbs are invariably planted by hand in Holland and Britain, where they are pressed upright and the correct distance apart into the soil at the bottom of a furrow and the soil ploughed or dug on to them, but growers here do not seem to regard it as important whether the bulb is planted the right way up or not. Accurate ploughing and placing are essential to facilitate subsequent lifting operations.

Cultivation and De-blossoming

Cultivation between growing tulips should be reduced to the minimum to avoid damaging the foliage, which becomes susceptible to fire disease if bruised. It is therefore unwise to grow tulips on land known to be weedy. Advantage should be taken of careful shallow cultivation before the shoots appear to get the land as weed-free as possible by the time growth starts.

Bulbs are easily mixed up, but a bulb grower's reputation and the demand for his products depend largely on his bulbs being true to name, and this in turn necessitates careful roguing each year to ensure that any bulbs not true to name are removed from the beds. Roguing can be done only from the appearance of the flowers, and it is therefore essential to let the plants flower each year. Beds should be gone through daily to dig out, remove, and destroy any plants which show signs of "breaking" (see later account of this disease) or the flowers of which are not true to type. At the same time the grower should view with grave suspicion any non-flowering "widows," as these cannot be rogued for variety, and it would be worth while removing them and heeling them in to grow on for another season.

It was universal practice before the war for overseas growers having ensured that the flower is true to type, to cut off the flower heads just below the petals and throw them away. (No one has ever been able to find a commercial use for these flower heads.) Pre-war growers regarded de-blossoming as essential in the case of hyacinths, tulips, and iris, and advantageous in the case of narcissi and gladioli.

As already explained, de-blossoming is not as widely practised now as formerly, but there is little doubt that the superb size and quality of bulbs which used to be produced by Dutch and British growers was due at least in part to the system of de-blossoming plants grown for bulb production. The cutting of flowers with long stems and a leaf or two from plants grown for bulbs undoubtedly reduces the size of the bulbs produced, and this effect is a cumulative one, becoming more noticeable year by year.

Some of the small bulbs planted for increase by New Zealand growers are de-blossomed, but research work on this point might well show outstanding advantages for much more widespread de-blossoming, especially if there is any substantial fall in the price of cut flowers.

[*Jack Welsh and Sons photo.*

In New Zealand most commercial bulbs are grown in widely-spaced rows to permit cultivation to be done by mechanical equipment. Here a tractor outfit is hoeing between three rows of tulips at once on a bulb farm in Otago Central.

Lifting the Bulb Crop

Tulips grown commercially must be lifted every year so that the bulbs may be replanted on new land, thus preventing overcrowding and, above all, allowing them to be graded annually so that bulbs of similar performance can be kept together, a most important point in the management of bulb stocks.

If the bulbs are lifted too early, their skins will be of a poor, pale colour, but if they are left too late, the skins are liable to crack badly and the clusters of bulbs tend to separate, making it difficult to be sure of getting them all during lifting. The usual commercial practice is to lift tulips when the foliage goes brown and the stalk will bend without breaking. At this stage, which usually occurs in late December or January, the skins are not quite set and the bulbs can be lifted without the skins cracking.

On a commercial scale the bulbs are usually ploughed out by turning them over in a furrow, from which they are picked by hand, and in turning the furrow considerable skill is required to avoid damaging the bulbs and yet at the same time to expose them as much as possible.

Immediately the crop is lifted the bulbs must be put in shallow layers in trays and stacked in a cool, airy place to dry. It is very damaging to tulip bulbs to leave them lying out in the sun, even for a few hours, and it is equally undesirable to put them in thick layers or heaps before they are quite dry, as this inevitably leads to sweating and the development of unsightly moulds.

After drying, the bulbs are cleaned by removing broken pieces of old skins and the bases of dead flower stalks, and the clusters of bulbs are gently separated. Finally the bulbs are graded as described in the previous article. Grading may be done by hand or by machine.

Saleable bulbs are dispatched in stout brown-paper bags punched with holes for air circulation, or in wooden crates with a small proportion of shavings. In either case fairly firm packing is essential, as loosely-packed bulbs shake about in transit and bruise badly.

While out of the ground bulbs should be held in a suitable store. Overseas growers almost always have a special storehouse for tulips, insulated against over-heating in hot weather yet with a hot-water heating system for use in cold spells, where the temperature can be maintained fairly uniformly at 55 to 60 degrees F., as this is said to prevent the skins from cracking and ensures that the bulbs remain in perfect condition. Though it is not necessarily damaging for a bulb to have a cracked skin or, indeed, to have no skin at all, buyers prefer bulbs with whole skins. Bulbs are fragile and should be handled with care at all stages to avoid any bruising or damage.

Yield is important, as it affects the profitability of commercial bulb growing. Few figures are available of yields under New Zealand systems of management, but overseas tulips are expected to double the weight and substantially increase the number of bulbs each year, and under really good conditions the weight may be nearly trebled and the number of bulbs doubled, depending upon the size and type of bulb planted out.

Commercial Production of Flowers

The proportion of their blooms at present customarily taken by growers of tulip bulbs for sale as cut flowers are picked, preferably in the early morning, when the bud is almost fully developed, each stem being cut with one or two small leaves, but leaving the two lower leaves on each plant to nourish the developing bulbs.

It is essential that the flowers should be carried at once to a cool, dark store, where they are stood in deep water nearly up to the flowers and for several hours are given the "long drink" that is so important in ensuring that they arrive at the market in good condition and last well after the housewife gets them.

After a few hours in water the flowers are taken out, allowed to drain, and tied in bunches of sixes or twelves, according to the custom of the markets. It is usual to keep the heads approximately level in a bunch of tulips and not to "face" the bunch as with other flowers. Each bunch is tied tightly at the bottom and again more loosely two-thirds of the way up. The bunches are then packed firmly, but not crushed, into wooden cases well lined with non-absorbent paper.

Picking and packing tulip flowers on a large scale require suitable equipment and a considerable amount of organisation if the work is to be done efficiently and the flowers are to arrive at the market in perfect condition.

COMMERCIAL CULTURE OF TULIPS

[*Jack Welsh and Sons photo.*

Tulips planted on the Continental bed system in an Otago nursery. This system involves more hand work, but makes much more economical use of the land.

Forcing Tulips under Glass

Few tulips are grown under glass in New Zealand, but this is a most important part of the cut-flower business in America and Europe, where many millions of tulips are forced in glasshouses or grown in frames every year. The bulbs are set thickly in boxes of soil, grown outside with a covering of soil or ashes for a few months, and then taken into glasshouses for forcing into flower. This is a tricky business requiring accurate control of temperature at each stage of growth, especially in growing out-of-season Darwin tulips, which are "prepared" for early forcing by special storage treatment. Tulip forcers also have to contend with certain diseases which can prevent proper development of the flowers at the high forcing temperatures. When in flower the stalks are cut off at ground level, and the bulbs are then thrown away.

Length of stem is an important factor in deciding the price of cut tulips, and those which come on to the markets in New Zealand are rather short stemmed by overseas standards. Some growers of forced tulips at Home used even to cut the bulb across and pull out the stem to give it an extra inch in length, while field-grown tulip flowers were cut off at ground level with no regard for the welfare of the bulbs, which were in any case usually discarded.

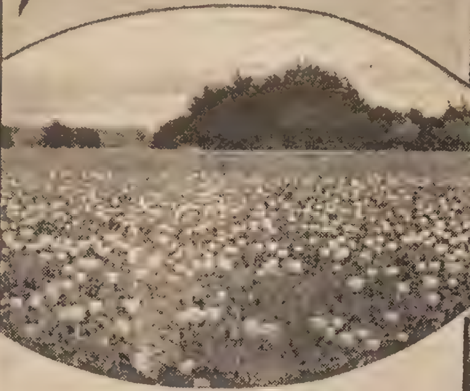
"Preparation" of Bulbs for Forcing

Tulips are such popular cut flowers in overseas markets that there has been a great deal of research into the treatment of bulbs to make them flower earlier or later than normally. This has so spread the season when tulips can be put on the market that they can now be bought from florists for about five months of the year.

Heat or cold applied to bulbs advances or retards their development, depending upon the stage at which it is applied. For tulips heat while the flower bud is growing hastens its growth, whereas after it has formed heat retards further development.

It has been found possible, especially with some popular varieties of Darwin tulips, to "prepare" the bulbs for both early forcing in glasshouses and late flowering outdoors by suitable heat treatments, but these have to be most carefully carried out, and it is by no means certain that they would produce the same results under New Zealand conditions. Briefly, "preparation" for early flowering consists of storing the bulbs at a low temperature until the leaves have formed inside the bulbs, then at a high temperature to hasten flower bud formation, and finally at a low temperature until planting time to encourage rapid rooting.

Tulips BY THE MILLION



Prospects are good in tulip growing both for cut flowers and bulb production. Flowers are here shown being cut for market (above) on a large tulip farm and (right) being bunched and packed for market after being given a "long drink" by standing them for a few hours in deep water nearly up to the flowers. This ensures that they travel well to distant markets.

[Photographs on left by Green and Hahn Ltd., top right by Jack Welsh and Sons, and bottom right by G. E. Clarke.

It is a curious fact that cool storage and planting conditions actually speed up the early growth of tulip bulbs instead of retarding them, though very low temperatures can cause the flowers to be abnormal or even to fail completely. On the other hand, very high temperatures are said to cause the bulbs to produce a cluster of small new bulbs in the next season instead of the usual two to four large ones. It is therefore essential that the temperature at each stage should be accurately controlled, and overseas tulip growers have specially-constructed and artificially-heated chambers for this purpose.

[Photograph by courtesy of Seymour Cobley Ltd.

Tulips planted for bulb production in Britain. The flowers are left to open, to make sure that all the bulbs are true to name, and the flower heads are then cut off just below the petals and collected and destroyed, as no one has so far found a use for them. It seems wasteful to cut off the flower head and throw it away instead of cutting it with a long stem and a few leaves and selling it as a cut flower, but the result is a much heavier crop of bulbs to lift.

DISEASES AND PESTS

Though tulips are usually fairly healthy, they are from time to time affected by two important diseases and two pests, any or all of which can cause serious trouble if not controlled.

The diseases are tulip "fire" (caused by a fungus *Botrytis tulipae* (Lib.) Lind.) and tulip "breaking," which is now known to be due to a virus (Tulipa virus 1 of Smith, 1937). The pests are various species of green fly and the bulb mite (*Rhizoglyphus echinopus* (*hyacinthi*)).

One other disease which has been found in New Zealand (caused by *Sclerotinia sclerotiorum* (Lib.) de Bary.) is of less importance, and a number of diseases, such as grey bulb rot, that are very troublesome overseas have not so far been recorded here, though they possibly occur to some extent.

Tulip fire causes some loss every year, but occasionally sweeps through beds of tulips and ruins every leaf and flower. These epidemics usually occur during spells of cold, wet weather, which provides ideal conditions for the very rapid spread of the disease, but in relatively-dry, warm seasons the fire may cause very little trouble.

Wholesale spotting and scorching of foliage and flowers are the most obvious indications that an attack of fire has developed, but little can be done at this stage to control the fungus, which can be kept down only by attacking the disease at other stages. It is therefore necessary to understand the rather complicated life history of tulip fire if its ravages are to be prevented.

The first and most important indication of fire is the appearance of occasional distorted, malformed shoots and leaves, which are often torn and ragged and do not usually grow, but remain stunted. These abnormal plants are called **"primary infections."** The grey or greyish-green diseased areas on the stunted leaves produce myriads of fine, grey, dusty spores which blow about and may alight on healthy leaves or flowers.

On leaves the spores give rise to small circular or oval yellow spots, each surrounded by a dark-green area. Most of the spots remain small, but some grow much bigger and produce a further crop of spores. There is also a general reddening of the leaf, from which the disease gets its name of "fire."

Flower buds which are attacked are often killed by the fungus before they can open, but the petals of **expanded flowers** are also very commonly affected by the fungus, which causes small white or light-brown spots which disfigure the blooms and ruin them for cutting.

Bulbs are also attacked, showing circular deep yellow or brown scars with raised margins. Hard, black, shiny bodies ("sclerotia") looking like dots of Indian ink may be formed, either embedded in these scars or adhering to the brown skin around the bulb, especially near the nose, or, most commonly, on the old, dried flower stalk attached to its base.

Bulbs do not always show these symptoms, even if the crop was badly diseased with fire, but sclerotia can usually be found on bulbs lifted from a bed where fire occurred, and even a few infected bulbs can spread infection through the whole of the new crop. Once a shoot from an infected bulb grows through the ground in spring the disease soon becomes widespread on leaves and flowers if weather conditions favour its spread.

The black resting bodies are most important, as they serve to carry the disease from one season to the next. If they drop off when bulbs are being lifted or infected bulbs rot in the ground, the resting bodies will remain alive in the soil for two or three years, and those which remain attached to a bulb will be planted with it and may infect its new growth the next spring.

To control this troublesome disease the first measure must obviously be to avoid planting tulips in a bed where fire has occurred during the previous three years, since the new bulbs are almost certain to be re-infected by the resting bodies left behind in the soil, though the severity of the attack on leaves and flowers will depend mainly on the weather. The oftener tulips are grown in one bed the more chance there is of the soil being heavily contaminated with fire and the less chance there is of a healthy crop.

The second obvious control measure is to inspect tulip bulbs carefully before planting and burn any bulbs which are scarred or pitted or which show black sclerotia on the brown outer skin (tunic) or stub of the old leaf stalk. If any sclerotia at all are found on the bulbs, or the previous crop was known to have had fire, it probably pays to skin off the brown outer scale from each bulb before planting, as it is impossible to see every sclerotium with the naked eye. Even skinning the bulbs, though a useful measure, will not wholly prevent the carry-over of disease.

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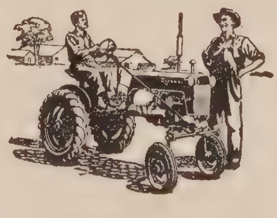

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Many infected bulbs rot in the ground and do not produce shoots at all. This is to the advantage of the grower, as it reduces the risk of epidemic spread of the disease from "primary infections," and may be one reason why it seems best to plant tulips very deeply, as the deeper the bulb is planted the more likely infected shoots are to die before reaching the surface. Late planting and wide spacing also seem to give some measure of control overseas, but the effects of these in New Zealand have not been fully investigated.

The most important single item in controlling tulip fire is to keep a strict watch in early spring for the appearance of "primary infections." The beds should be closely inspected every few days and any abnormal plants carefully dug out, with their surrounding soil, put in a bucket, and soil and bulbs burned or very deeply buried at once. This material must not be put on the compost heap.

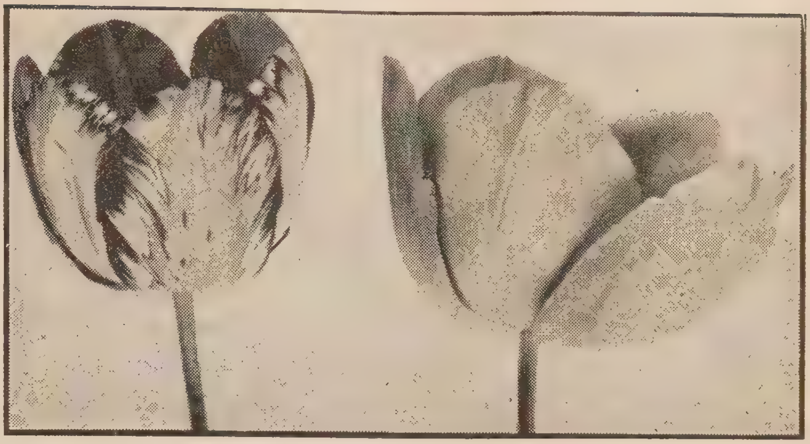
Tulip fire can be kept within reasonable bounds by following these control measures, which are mainly cultural. Much work has been done overseas on the use of soil sterilisation, dipping the bulbs in disinfectants, and spraying the leaves for the control of fire, but none of these has so far given consistently-good results.

Though in many seasons tulip fire may not be troublesome, it pays to take all the precautions detailed, as the presence of infection in a stock is a dormant menace that may ravage the whole stock in a wet, unfavourable season.

Tulip "Breaking"

One of the commonest yet least-understood diseases of tulips has been the so-called "breaking," in which flowers become streaked and striped with brighter colours than normal for the variety.

Nowadays "broken" tulips are regarded as useless, as they spoil the appearance of beds planted with self-coloured varieties, but "broken" tulips have not always been considered spoilt. Varieties favoured by the early Dutch growers were all "broken," but the petals had to be marked in certain intricate ways to be fashionable and appeal to connoisseurs. The early "broken" varieties were classified into groups according to their colour ("bizarres," "bybloemens," etc.) and the pattern of their stripes ("feathered" or "flamed") and as early as 1637 the Dutch growers knew that a worthless self-coloured tulip ("breeder") could be broken by grafting into the bulb a plug of tissue taken from the bulb of a "broken" variety, though the manner in which the breeder would break seemed entirely a matter of chance.



Tulip "breaking," caused by a virus, results in plants which should have self-coloured flowers (right) producing instead flowers violently striped with purple, red, or pink lines, between which the flesh is yellow or white. "Broken" tulips are now considered worthless, though they were at one time much admired by tulip fanciers. A "broken" tulip never recovers and all its descendants will also be broken.

Tulip fire disease can completely ruin blooms, the petals of which become distorted and covered with small white or light brown spots.

Broken tulips never recover and produce self-coloured flowers again. In addition to striping of the flowers, the leaves and sometimes even the stem show irregular flecks and mottles of a light green, while the flowers of broken tulips are usually a little late in opening. Affected plants are dwarfer and less vigorous than usual, and though they produce new bulbs which appear quite normal, each one of these and all its progeny will grow into a broken tulip and will never revert to normal.

Though the effects of "breaking" have long been known, it is only in recent years that it has been shown to be due to one or more infectious viruses, which are carried in the sap of every part of affected plants and passed in the sap to each of the new bulbs produced by them.

The mechanism of tulip striping is interesting. Each petal is composed of a thick layer of opaque inner tissue covered on each side by a very thin layer of transparent cells. The inner tissue is white in some tulip varieties and yellow in all the others. The sap in the cells of the outer skin may be colourless or dyed with a brilliant red or purple plant pigment (anthocyanin). The colour of the tulip flower depends on the white or yellow ground showing through the dye in the skin, all the great range of colours in tulips being produced by various combinations of the inner and outer colours.

The effect of virus is to rearrange the anthocyanin in the skin (without affecting the total quantity), leaving strips of the skin quite transparent and concentrating the colour in flecks and strips. Naturally the ground colour of white or yellow shows through in places where there is no anthocyanin. The stripes of the broken tulip are thus composed of (a) colours normal for the variety, (b) the ground colour of the inner tissue showing through transparent patches of skin, and (c) patches of the normal anthocyanin dye much intensified and masking the ground colour. The "breeder" or "mother" tulips referred to by the Dutch were varieties which had anthocyanin in their petals and which could consequently "break" into new forms if infected with the virus. Tulips with transparent skins (that is, white and yellow varieties) may be infected with the breaking virus, but show few symptoms, as there is no anthocyanin to be affected, and can never give rise to broken, striped varieties.

Apart from the invariable transmission of virus from an affected plant to all its new bulbs, healthy tulips can be infected with "breaking" virus in a variety of ways. The most important is by green flies, a number of species of which can readily transmit the virus if they feed on a healthy plant after sucking the juice of an infected one. Green flies move about from plant to plant in the border, especially at the time the flower buds are showing and the flowers are opening, but they also infest tulip bulbs in store, where, moving from bulb to bulb, they can spread the disease rapidly through a stock at this time. It is also quite possible for the disease to be spread from plant to plant on the knife or shears used for cutting blossoms. A healthy plant infected during the growing season does not usually show any symptoms of the disease until the following year, when both leaves and flowers may be affected.

Some home gardeners do not seem to mind having a proportion of broken tulips in their beds, or may even admire them, but most horticulturists detest these abnormal blossoms and commercial growers of tulip bulbs will certainly soon lose the good will of the buying public if their bulbs are found to produce a high proportion of "broken" blooms in the first year. This would be specially the case in bulbs grown for export, but fortunately there are some stocks in New Zealand which are remarkably free from "breaking" virus.

Nowadays there is little breaking in Continental stocks of tulips, where proper precautions even enable certain broken varieties (Rembrandts, for example) to be grown with little risk to unbroken stocks. However, some stocks in New Zealand now contain too many broken tulips, and to keep this insidious virus in check, both in home gardens and commercial nurseries, the following routine precautions should be taken to control the disease:—

1. There should be very careful and drastic roguing out of all infected plants, which should be dug up with their bulbs and destroyed by burning. This roguing should be carried out early every morning, and **before any flowers are cut or green flies appear in the beds,** from the time the flower buds show the first sign of colour until the last buds have fully opened. Conscientious roguing will do much toward cleaning up a stock of tulips affected by breaking.

A tulip bloom attacked by green fly, which can mark and spoil the flower, as well as spread tulip "breaking" virus.

2. A careful watch should be kept on the growing plants for green flies, which should be controlled by spraying as soon as they are noticed.

3. Green flies should also be controlled by fumigation if they are seen to be infesting bulbs in the store.

4. In hot, dry northern districts, where green flies are particularly difficult to control, it may prove almost impossible to keep breaking virus in check, and in these places the only solution may be the regular reintroduction of healthy, unbroken stocks from more fortunate districts.

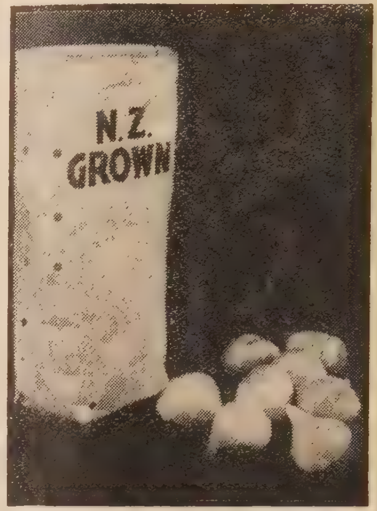
Green flies are less important in themselves than as carriers of the serious tulip "breaking" virus. Nevertheless a serious infestation of green flies can cause some damage to bulbs in store and great disfigurement (not to be confused with tulip "fire") of the opening flower buds.

Bulbs in store should be frequently looked over and fumigated if necessary with some chemical such as nicotine sulphate or para-di-chlorobenzene, which is now available in convenient form from chemists. At the first sign of infestation on growing plants, especially toward flowering time, the bed should be sprayed with nicotine sulphate.

Bulb mite can cause various bulbous plants to rot and die, while less seriously affected plants may survive but will produce sickly yellow shoots with stunted leaves and flowers. The mites, which are very small, 1/50 to 1/25in. long, with six or eight legs, may be found in large numbers sheltering in and between parts of the bulbs. At certain seasons they migrate through the soil from diseased to healthy bulbs, where they commence to breed very rapidly, but are mainly spread through distribution of affected bulbs, as all new bulbs produced by an infested one are likely to contain a number of mites.

Affected bulbs can usually be recognised by their softness, and the presence of mites is usually confirmed if the bulbs show rotten places when cut open. Infested bulbs should be destroyed by burning. A proportion of bulbs in an affected stock will probably feel firm, though they contain a few mites, but if such slightly-affected bulbs are planted out, they will serve as sources of infection of other bulbs in the bed. If stocks are known to be infested, badly-affected ones should be destroyed and the remainder dipped for 10 minutes in a 1 in 400 solution of nicotine sulphate (40 per cent. strength) heated to a temperature of 122 degrees F. before dipping. Sound, healthy bulbs in which root growth has not started will not be injured by this treatment, which will deal effectively with the mites.

NEW ZEALAND BULBS ARE BEST FOR NEW ZEALAND GARDENS



Bulbs are best stored and transported in stout paper bags or cardboard boxes with enough holes to allow free circulation of air.

Books to Read

As is to be expected, a great deal has been written about the growing of a flower of such antiquity as the tulip. The following publications will be of interest to anyone wishing to know more about tulip culture:—

"The Book of the Tulip," A. D. Hall, London: Martin Hopkinson, 1929, 21s. sterling.

"The Genus Tulipa," A. D. Hall, London: Royal Horticultural Society, 1940, £1 13s. (N.Z.).

"Daffodil and Tulip Year Book, 1946," London: Royal Horticultural Society (for details of the official system of classifying tulip varieties), 8s. 6d. sterling.

"Commercial Bulb Production," Bulletin No. 62 of the British Ministry of Agriculture and Fisheries (at present out of print but being republished).

Acknowledgments

Acknowledgment is made to the Director, Plant Diseases Division, Department of Scientific and Industrial Research, for assistance given by members of his staff in compiling the section on pests.

Reference has also been made to work reported in the following publications:—

"Diseases of Bulbs," Bulletin 117 of the British Ministry of Agriculture and Fisheries, 1939.

Pamphlet No. 4 of the Seale-Hayne Agricultural College.

"Shifting the Periodicity of Bulbs," Bulletin 28 of the Wageningen Laboratory, 1930.

"Destructive and Useful Insects," by Metcalf and Flint.

Honey for Cooking

To many people honey is merely a sweet substance to spread on bread or toast in place of jam or marmalade, but this oldest of natural foods can be used in innumerable ways. Some of the recipes given in this article by Eva Topping, Rural Sociologist, Auckland, should be acceptable to beekeepers who have plenty of honey for their household use and to others who enjoy the pleasant taste of honey. As well as sweetening foods, honey adds its own characteristic flavour and gives a greater variety to every-day meals. There are ways of using honey which are appropriate for every meal from breakfast to supper.

WOODSIDE PUDDING WITH HONEY-COCONUT SYRUP

HONEY CARAMELS AND HONEY FUDGE

[Photographs on this and preceding pages by Sparrow Industrial Pictures Ltd.

RECIPES FOR COOKING WITH HONEY

THOSE who keep even one hive of bees will probably find they have honey to spare, and this surplus can be used instead of sugar for many sweetening purposes. Honey is good for bread baking and for most types of cake, as the products have better keeping qualities, though for the lighter sponge type of cakes it is not so suitable, as it makes them a little too moist and not quite so light in texture.

FOR sweetening fruit, honey is used in much the same proportions as sugar, though, as it is not only a sweet but a sweet with a flavour, it frequently alters the characteristic taste of the fruit. Preserved fruits can also be put up with honey, or better still, with part honey and part sugar. The fruit flavours are altered slightly and the appearance of the finished bottles is darker and not quite so attractive when all honey is used.

All honey may be substituted in baking recipes in which the amount of sugar required is small—for instance in scones, breads, and some biscuits. In cakes and puddings for which more sweetening is necessary it is better to use part honey and part sugar, for the two substances differ in composition. Sugar is a sweet containing no acid and no moisture, but honey consists of several types of sugar in solution with water and has a slight degree of acidity. Therefore, when honey is used instead of sugar in a recipe the moisture and acidity of the honey must be taken into consideration. It has been found that by observing the following rules practically any recipe may be adapted for the use of honey:—

1. Measure honey in the liquid form; if it is granulated, heat it over warm water until it is liquid before measuring it.

2. For each cup of honey used reduce the liquid asked for in the recipe by about one-fifth so that the batter or dough is of the usual consistency.

3. Use ¼ teaspoon of baking soda to each cup of honey to counteract the acidity.

For most cake, bun, and biscuit recipes use half sugar and half honey, reducing the liquid content and adding baking soda in the proportions given. Fruit cakes are an exception; they may be made with all honey, which improves both keeping qualities and flavour.

In milk puddings, sauces, pie fillings, and the like add the honey with the thickening.

Honey for Breakfast

When the family begins to tire of comb, liquid, or granulated honey try some of these recipes on the breakfast toast:—

Apricot and Honey Marmalade

This quickly-made confection requires no cooking. Soak dried apricots for 10 minutes in hot water, drain them, and put them through a mincer, using the finest cutter. With each cup of minced apricots thoroughly mix 1½ cups of honey and fill sterilised jars. Cover the jars closely and store the marmalade for at least two weeks before using it. It is delicious on toast or scones and can also be used for filled scones. Make the usual scone mixture, cut it into rounds, make an indentation in the centre of each, and fill it with a little apricot marmalade. Brush the scones with melted butter or milk and bake them for 10 minutes.

Orange Honey Spread

2 cups of honey
½ cup of grated orange rind
½ cup of grated grapefruit rind
Pinch of salt

Mix the ingredients well and stand them over warm water for half an hour to blend the flavours thoroughly. Put the spread into small pots.

Honey Butter for Filling Grapefruit

Beat 1 cup of honey and ¾ cup of butter to a soft cream. Add the grated rind of one or two oranges or lemons according to taste, and beat again to blend thoroughly. Put the mixture into a wide-mouthed jar and stand it in a cool place to harden.

Halve grapefruits, loosen the pulp from the pith, and remove the centre core. Fill each half with honey butter.

For Use with Meats

Honey Mint Sauce for Lamb Chops or Roast Mutton

1 cup of honey
2 tablespoons of vinegar
¼ cup of chopped mint
½ cup of water

Heat the water and vinegar, dissolve the honey in the liquid, then add the mint. Use the sauce to baste roast mutton or serve it separately at the table.

Horse Radish Sauce for Roast Beef

3 tablespoons of grated horse radish
½ cup of top milk or cream
¼ cup of honey
1 tablespoon of vinegar

Warm the honey until it is liquid and add it to the milk and horse radish. Add the vinegar gradually. Stand the sauce aside in a cool place until it is ready to use.

Salad Dressings

Boiled Salad Dressing (1)

1 egg
4 tablespoons of melted butter
½ teaspoon of mustard
2 tablespoons of honey
1 cup of milk
Pinch of cayenne pepper
½ cup of vinegar
1 tablespoon of flour
1 tablespoon of cornflour
Pinch of salt

Melt the butter, add the flours, and stir them to a smooth paste. Add the milk slowly, stirring continually, and cook the mixture until it is thick. Add salt, pepper, vinegar, and mustard to the beaten egg and put them through a strainer into the thickened mixture. Cook it for a few minutes, then add the honey. Store the dressing in a jar in a cool place and dilute the required quantity with top milk when needed. Add more honey to the diluted dressing if it is desired sweeter.

Boiled Salad Dressing (2)

1 teaspoon of salt
1 teaspoon of mustard
Shake of pepper
2 egg yolks
½ cup of vinegar
2 tablespoons of flour
3 tablespoons of honey
1 tablespoon of butter
1 cup of milk

Mix the mustard, salt, pepper, and flour together, then add the milk, honey, and egg yolks. Stir the mixture well and cook it over hot water until it is thickened. Add the vinegar and butter, stirring well to make a smooth mixture. This dressing keeps well and can be diluted with cream or milk when required for use.

Fruit Salads

When the ingredients are raw fruits which have little juice of their own, such as melons, tree tomatoes, Chinese gooseberries, apples, and bananas, honey syrup makes a satisfactory and delicious addition to fruit salad. Mix 1 cup of honey with ½ cup of water, bring them to the boil, cool them, and add the strained juice of a lemon. Prepare the selected fruit, slice it into a salad bowl, and pour over it the required quantity of honey syrup.

Melon Salad

1 cup of diced water melon
1 cup of diced rock melon
¼ cup of honey
Juice of 1 lemon
¼ cup of whipped cream (when available)

Blend the honey and lemon juice, pour them over the fruit, and leave the salad to stand for an hour or more. Fold in the whipped cream and serve it on small glass plates or individual salad dishes.

Autumn Salad

Skin tree tomatoes after dipping them into boiling water and slice them into a salad bowl. Add sliced bananas, diced apples, and the pulp of one or two passion fruits. Pour over them the required quantity of honey syrup, made in the proportions given. Decorate the salad with slices of Chinese gooseberry and stand it in a cool place for an hour or two to allow the flavours to blend.

Pies Using Honey

Pumpkin Pie

1¾ cups of mashed cooked pumpkin
1½ cups of milk
2 eggs
⅓ cup (packed tight) of brown sugar
1 teaspoon of cinnamon
⅓ cup of honey
½ teaspoon of ground ginger
½ teaspoon of nutmeg
¼ teaspoon of ground cloves
Salt

Beat the ingredients together thoroughly and pour them into a pie plate lined with pastry; the quantities given are sufficient for a 9in. pie plate. Flute the edge of the pie crust and decorate the top with pastry shapes. Bake the pie for about 40 minutes in a moderately-hot oven until the edges of the filling are set and the centre is still rather soft.

Honey Fruit Pie

1½ cups of raisins, currants, and sultanas mixed
1 tablespoon of orange and lemon peel
4 tablespoons of lemon juice
¾ cup of honey
2 tablespoons of butter
2 tablespoons of cornflour
1 cup of cold water
Pinch of salt

Mix the cornflour with a little of the cold water until it is smooth, then add honey, fruits, butter, and the rest of the water. Bring the mixture to the boil and cook it for 3 or 4 minutes until it begins to thicken. Pour it into a pastry-lined deep plate, cover it with pastry, and bake the pie in a moderately-hot oven for 30 to 35 minutes.

Apple Pie

Slice prepared apples into a piedish and pour over them 1 cup of honey mixed with 1 tablespoon of lemon juice or water. Add a few cloves or ½ teaspoon of cinnamon and dots of butter. Cover the fruit with a pastry crust, flute the edges, and prick the top for decoration and to allow steam to escape. Bake the pie for about 40 minutes in a moderately-hot oven.

Baked Puddings

Honeyed Apple Crisp

Spread 4 cups of sliced apples in a shallow dish and pour in 2/3 cup of honey mixed with 1 tablespoon of warm water, or slightly more if the apples are a dry variety. Mix together in a bowl ½ cup of flour and ¼ cup of brown sugar and work in ¼ cup of butter, making the mixture crumbly. Add ¼ cup of chopped walnuts and spread the mixture evenly over the apples. Bake the pudding in a moderate oven for 30 to 40 minutes until the apples are tender and the crumb crust is crisp and browned.

Woodside Pudding

Make a standard scone mixture using 1 cup of flour, and cut the dough into rounds. Melt 2 tablespoons of honey in 1 pint of hot water, pour it into a baking dish, put it into the oven until the syrup is boiling, then arrange the scone rounds in the dish. Bake them in a moderate oven, basting them frequently with the honey syrup.

For a variation 3 tablespoons of desiccated coconut can be added to the honey mixture in the dish.

Honey Pudding

¾ cup of flour
1 teaspoon of baking powder
⅓ cup of sugar
2 tablespoons of butter
½ cup of milk
4 tablespoons of currants
1½ teaspoons of grated lemon rind

Cream the butter and add the sugar gradually, beating well after each addition. Add 2 tablespoons of the milk and beat again. Add the sifted flour and baking powder alternately with the remaining milk, beating the mixture well until it is smooth. Add the currants and lemon rind.

Turn the batter into a well-greased dish and pour over it a mixture made with 2 tablespoons of butter, ½ cup of honey, 1¼ cups of boiling water, and a pinch of salt. Bake the pudding in a moderate oven (350 degrees) for 40 to 45 minutes.

Pudding Sauces

For serving with plain steamed or baked puddings, sauces made with honey have a smooth taste and distinctive flavour.

Hot Honey Sauce

2 dessertspoons of cornflour
½ cup of honey
1 cup of water
Juice of 1 lemon, orange, or grapefruit
1 dessertspoon of butter

Mix the cornflour with a little of the water, add the honey and the rest of the water, then cook the mixture over hot water until it is thickened. Add the butter and lemon juice, and serve the sauce in a jug or sauce boat with a plain steamed or baked pudding or on pancakes.

Honey Hard Sauce

Cream 1/3 cup of butter until it is very soft and gradually beat in ¾ cup of honey. Add 1 teaspoon of lemon juice or vanilla essence and set the sauce aside to become firm before being served.

Apple Rolls with Honey Sauce

Mix 2 cups of flour, 1 level teaspoon of baking powder, ¼ cup of dripping, and ¾ cup of milk as for scones, handling them as little as possible. Roll the mixture out ¼in. thick and spread it with sliced apples sprinkled with ½ cup of sugar and a little cinnamon or mixed spice. Roll it up and cut it into 1in. slices. Place the slices cut side down in a greased baking dish and put 1 teaspoon of melted butter over each. Bake them in a moderately-hot oven (400 degrees) for 20 to 25 minutes.

For the honey sauce mix 1 cup of honey, 1½ cups of water, 1 tablespoon of cornflour, 1 tablespoon of butter, and a pinch of salt and cook them until the mixture is clear, stirring constantly. Add vanilla to taste and serve the sauce with the apple rolls.

Honey Custards

2 eggs
⅓ cup of honey
Salt
1 pint of milk
1 teaspoon of vanilla
1 tablespoon of butter

Beat the eggs, add the honey and milk, and beat them well. Flavour with vanilla and salt. Pour the mixture into a buttered piedish or individual custard cups and dot the rest of the butter on top. Bake it in a slow oven. Serve the custard in cups or turned out on to dessert plates and surrounded with stewed or fresh pulped fruit.

For a change put 1 teaspoon of honey into the bottom of each custard cup before filling it. When the custards are baked turn them out on a serving dish and the honey will make a brown sauce over each.

Baked Fruit

8 halves of pears
¼ cup of lemon juice
2 tablespoons of butter
1 teaspoon of cinnamon or 8 cloves
¼ cup of honey

Arrange the pears in a well-buttered shallow glass ovenware dish. Pour over them the lemon juice and honey mixed, sprinkle them with cinnamon or, if using cloves, insert one into the blossom end of each pear half. Dot them with the rest of the butter and bake them in a moderate oven until they are tender.

Peaches may be prepared in the same way.

For baked apples core the required number, leaving a little core in the base to act as a plug. Fill the cavity with honey and raisins, honey and dates, or honey and spice.

Cake Fillings

Honey Orange Filling

Mix ½ tablespoon of flour, 1 tablespoon of cornflour, 1 beaten egg yolk, ¼ cup of honey, and salt until they are smooth and put them in a basin in a saucepan of hot water or in a double saucepan. Stirring constantly, add slowly 2 tablespoons of orange juice, 1 tablespoon of water, and 1 dessertspoon of lemon juice. When the mixture is hot blend in 1 teaspoon of butter and the grated rind of half an orange. Continue cooking until the mixture is smooth and thick. Cool it before spreading it between layers of cake.

Boiled Honey Icing

1 cup of honey
¾ cup of sugar
2 egg whites
Salt
Flavouring and colouring as desired

Measure the honey into saucepan, stand it in a larger saucepan of boiling water, and simmer it over a low heat for 10 minutes. Add the sugar and egg whites and beat the icing hard for 10 minutes over the heat until it piles up readily. Add any flavouring or colouring required and spread it over the cake.

Honey Soft Icing

Measure 1/3 cup of honey into a small saucepan and heat it gently for 10 minutes. Cool it, then add 2 egg whites, and beat them well until the icing forms peaks. Colour it slightly and ice the cake.

Grated orange or lemon rind added to the meringue icing will give both flavour and colour.

Small Cakes

Honey Nut Puffs (illustrated on opening page)

1 cup of honey
1 cup of chopped nuts
4 tablespoons of crisp breadcrumbs
1 cup of chopped raisins
Juice of 1 lemon

Mix the ingredients thoroughly and place teaspoonfuls on 2in. squares of pastry. Moisten the edges and press them together to form triangles. Bake the puffs in a moderate oven (325 degrees) for 25 minutes.

Honey Snaps (illustrated on opening page)

½ cup of honey
1 cup of flour
1 teaspoon of vanilla
½ cup of butter
½ cup of sugar
Salt

RECIPES FOR COOKING WITH HONEY

[*Sparrow Industrial Pictures Ltd. photo.*

Autumn fruit salad.

Heat the honey until it is boiling, remove it from the heat, add the butter, and stir until it is melted. Add the sifted flour, sugar, and salt carefully and stir until there are no lumps. Add the vanilla and drop the mixture from a teaspoon on to a well-greased baking sheet, leaving plenty of space between spoonfuls. Bake them in a slow oven (300 degrees) for 10 to 15 minutes until they are thin, bubbly, and browned. Take them from the oven, cool them a little, then pull the wafers from the sheet, rolling them with the top side out; if the wafers become too hard to roll, put them back in the oven to soften again. Take care that the oven is not too hot or the snaps will scorch and the honey flavour be lost.

Sweets Made with Honey

Honey Toffee

½ cup of white sugar
¼ cup of honey
⅓ cup of unsweetened condensed milk
½ cup of brown sugar
1 teaspoon of butter
Pinch of salt

Mix the ingredients in a saucepan and heat them until they are boiling slowly, stirring continually until the sugar is melted. Continue cooking, stirring occasionally, until the hard ball stage is reached—that is, when a little toffee dropped into cold water will roll into a hard ball. Take the toffee from the heat and add 1 teaspoon of vanilla and ½ cup of chopped nuts. Pour it into a well-greased tin and mark it into strips when it is half cooled.

Honey Caramels

1 cup of white sugar
⅓ cup of brown sugar
⅓ cup of honey
½ cup of unsweetened condensed milk
Pinch of salt

Combine the ingredients and cook them to boiling point, stirring continually. Continue boiling the mixture gently, stirring occasionally, until the soft ball stage is reached. Remove it from the heat and add 1/3 cup of butter. Cool it at room temperature until it is lukewarm (when the hand can be held comfortably under the saucepan the toffee has cooled sufficiently). Add ¾ cup of chopped nuts and 1 teaspoon of vanilla. Beat the mixture until it holds its shape, then drop it from a teaspoon on to waxed paper to set. Wrap each caramel in waxed paper.

Honey Fudge

2 cups of sugar
2 tablespoons of cocoa
1 cup of nuts
¼ cup of honey
1 cup of unsweetened condensed milk
1 teaspoon of butter
Pinch of salt

Boil the sugar, cocoa, and milk together for 5 minutes, then add the honey and cook the mixture to the soft ball stage, stirring as little as possible. Add the nuts and butter. Cool the fudge, beat it until it is creamy, and spread it in a greased tin to set.

Drinks, Hot and Cold

Honey adds its distinctive flavour to drinks and also sweetens them. For winter parties and social gatherings a hot, spicy, honey punch is just the right thing to speed the parting guests.

Hot Honey Punch

¾ cup of honey
1½ cups of hot water
1 pint of fruit juice
2 cups of hot, fresh tea
Grated nutmeg
Juice of 2 lemons
1 thinly-sliced lemon or orange
6 cloves
2 pieces of root ginger

Combine the honey, cloves, ginger, and water, simmer them for 5 minutes, then strain them. Add the freshly-made tea, lemon juice, and fruit juice, which can be any kind available; diluted syrup from preserved peaches, pears, apricots, nectarines, or black currants is suitable. Bring the punch just to the boil and remove it from the heat. Add orange or lemon slices and grate nutmeg over the slices.

Honey Lemonade

Hot or cold lemonade has an extra flavour when made with honey instead of sugar. Use 1 cup of honey to 1 quart of water and ½ cup of lemon juice.

Honey Cocktail

A delicious beverage of the more solid kind, honey cocktail is excellent for the convelescent's "little something at eleven." Beat together 1 egg yolk, 1 tablespoon of honey, the juice of 1 grapefruit or sweet orange, and the juice of half a lemon until the mixture is fluffy. Beat the egg white until it is stiff and fold it into the first mixture.

Honey Fruit Drink (illustrated on opening page)

Here is a recipe for a long, cool, refreshing drink to serve in summer:—

2 cups of honey
1 cup of lemon juice
1½ cups of fresh, strong tea
4 bottles of ginger ale
1 cup of well-crushed fresh fruit

Soft fruits like strawberries, raspberries, currants, and passion fruit are the kinds to use. Mix all the ingredients except the ginger ale and stand them aside for several hours to mellow. Add the ginger ale and, if available, cracked ice just before serving the drink. Float on each tumbler tiny leaves of bruised mint, a wafer-thin slice of lemon, or a small whole fruit of the kind used in the drink.

Awarua—Land Between Two Channels

[V. C. Browne photo.

EXCEPT for a porter or two the platform was completely deserted. Perhaps the hot sunlight made the travellers drowsy and disinclined for promenading, or perhaps it was because their destination was land's end, where life moves at a slower tempo, and already they were beginning to adjust themselves to the change; whatever the reason, there was none of the hustle and bustle which usually accompanies the departure of a train from a main station. The journey across the plains was a most leisurely affair, its progress being halted by sundry pauses at peaceful sidings with such picturesque names as Woodend, Greenhills, and the like. Even the business of ticket-clipping did not conform to the customary brisk routine, for the benevolent-looking guard with his slow Scotch smile had a pleasant tendency toward conversation and seemed to take a personal interest in his passengers.

"Well, we got you here safely," he remarked as I alighted at Bluff, where the station buildings occupy the land that was once the garden of a pioneer settler and the port's principal roadway passes over the spot on which his slab house stood. (When I visited Stewart Island a few days later I met one of his grandsons, who lives at Oban.)

The homes of the present population make a variegated pattern about the gorse-gold slopes of the great hill which gave the harbour its name. Awarua, the ancient Maori name for Bluff, likewise has a topographical significance, being translated as "land between two channels." The Harbour Board sought to perpetuate the name by christening its first paddle-tug Awarua. This was the first steamer to ply regularly across Foveaux Strait, thus greatly improving the transport system between Bluff and Stewart Island, which up to 1885 had been carried on by small sailing vessels. The sturdy grey ship giving such splendid service as a tug today also bears the historic name of Awarua.

Strangely enough, one of Bluff's earliest stationmasters was a sea captain from Belfast, who after many years of voyaging, mostly to America and the East, decided to settle in New Zealand. The turning of the first sod of the Invercargill-Bluff railway took place on November 25, 1863. (A photograph has been preserved of Deputy Superintendent Nathaniel Chalmers performing this important ceremony in the presence of a large crowd, portly gentlemen in bowler hats predominating. Several members of the constabulary were ranged in the foreground, keeping a stolid watch on proceedings, and there was the usual sprinkling of interested small boys, all sporting the beribboned sailor headgear so fashionable among juveniles at that time. A number of the ladies in the gathering had their parasols open to protect their complexions from the rays of the sun.) However, the line was not opened for public traffic till 1867, and Captain John Hunter commenced his new shore command, the charge of the station at Bluff, three years later, having brought his wife and children with him to New Zealand in the meantime.

He had held his certificate of competency as a master mariner since 1854, and souvenirs of his sailing days can be seen in the Southland Museum. These include his sextant, a pair of muzzle-loading pistols with engraved steel locks, curious, circular, marble ornaments carved in intricate dragon designs, pictures fashioned from sea shells, and two little scalloped, glass-topped, black boxes which are really Chinese toys; if you shake them, tiny tortoises and bright-coloured fish swim about as if they were in a pond. The Hunter children were fortunate indeed to have a father who brought them such fascinating playthings and told them wondrous tales of the far-off countries he had visited. Captain Hunter was later transferred to Wanganui and then to Central Otago, but when he retired from his railway work he went back to Bluff and supervised the unloading of vessels at the port.

One of his sons, now nearing his eighties, escorted me to see the Hunter residence, which after his parents' death he was responsible for rebuilding so that the younger members of the family could have a comfortable home. He pointed out the oldest houses en route; most of them had borders of fretwork or wrought-iron "lace" decorating the roof edge of the front veranda, one dwelling boasted a spire on each eave which created quite an ecclesiastical effect, and another had a ship's figurehead surmounting the side fence and the wishbone-shaped rib of a whaleboat serving as a garden arch. The Hunter home stood squarely on a rise some distance from the road, the pines he had planted sheltering it from storms. The sister who had married a sea captain with her father's flair for collecting all manner of curios in the course of his travels used to live next door, but the house was destroyed by fire long ago and only the shed where she kept her curios remains. Another sister went to Australia, but Martha, the third girl, began wedded life in a fairytale cottage further along the sea front. We passed the little storey-and-a-half house with its gabled roof and rose-red walls nestling against a green bank in a bend of the road on the way to Stirling Point (named after a well-known captain in the whaling days). There were only two houses on this windswept headland, and at the end of the long needle of rocks a pilot light flashed a warning to shipping to avoid the hazards of sailing too close to the dangerous reefs. Mr. Hunter remembered seeing the sands on the southern side of the point strewn with coal which had been washed ashore from a vessel wrecked on this jagged coast.

The road terminated presently in a grassy knoll bounded by bracken and blackberries and a barren wilderness of boulders that stretched toward the bush-clad shoulder of hill beyond. Bachelor's buttons gleamed like golden lights among the grasses, and the wild garlic flowers formed a milky way about our feet as we watched the dusk deepening over the sea. By the time we returned to Martha's cottage the sky was full of grey feathers of cloud, and above the rim of ngaios a slender crescent of a moon glimmered as softly yellow as the lupin spires along the shore. Martha must have often gazed on this same tranquil scene, perhaps slipping out on to the tiny upstairs porch under the eaves after singing her baby son to sleep, and lingering to look at the moonlight shining on the water. Though the house had been empty for years, and the ivy was beginning to weave its garlands about the windows, and bluebells brushed gently against the door, it did not have the desolate air that most deserted dwellings wear. Indeed, as the seawind softly stirred the ivy leaves overhead it seemed for a moment as though a shadowy figure beckoned to us from the doorway, and we glimpsed the gay ghost of the girl who had crossed that threshold as a bride and lived there so happily long, long ago.

Mary

Flower Gardening for Show or Shows?

NURSERYMEN offer a bewildering choice of plants, some of which are more suitable for exhibition at a flower show than for growing in a small home garden. In this article J. P. Hudson, Horticulturist, Wellington, draws attention to valuable suggestions about choosing plants recently made by the Royal New Zealand Institute of Horticulture.

A WELL-KNOWN lecturer on gardening recently said that "plants look best where they grow best." They should be fitted into an environment which will suit them, and they will then grow into fine specimens which will do justice to the site. A tree or shrub planted in a district or situation that does not suit it will never make a desirable garden feature, however well it may look elsewhere.

Choosing Varieties

In choosing trees, shrubs, or other plants the gardener should always consider whether his soil will be quite suitable for the varieties he wishes to plant and whether they will do well in the climate of his district. The latter point is easily settled by seeing whether the plants of his choice are growing well in local parks or private gardens in a similar aspect and with about the same amount of sun or shade as he proposes to give them. If so, there is no reason why the plants should not succeed in his own garden, provided soil conditions are equally suitable. Several gardening books written specially for New Zealand readers describe the types of soil in which popular garden plants grow best in the Dominion. Having decided by observation which plants regularly make the best show in his district and which will suit his soil conditions, the home gardener can order supplies with confidence, and start to plan the arrangement in which he will plant them on their arrival.

To be of value, however, these decisions on the regularity of flowering must be based on observations over at least several years, and careful records are needed of the dates of first and last flowering to find out which varieties maintain the longest display of colour in the garden. These observations can and should be made by keen home gardeners for their own satisfaction, but in most districts this local knowledge and experience have already been accumulated by professional horticulturists, superintendents of parks and reserves, nurserymen, and amateur gardeners of long standing.

In some districts this knowledge is already being made available to the growing number of inquiring new gardeners by lectures on gardening subjects, through the activities of a local horticultural society or gardening circle, or by articles in the daily papers and talks on the radio, in all of which valuable information about the best plants to grow is disseminated to the gardening public.

Show Varieties not Always Best

Unfortunately, some districts have none of these activities, while in many places the local horticultural society is mainly concerned with organising flower shows three or four times a year.

Undoubtedly flower shows serve a useful purpose in showing flowers grown to perfection and encourage some spectators to greater efforts in their own gardens. The shows also provide a meeting ground for those of similar interests and an absorbing hobby for growers of show flowers, who find special compensations for their endless trouble and pains in the thrills and satisfactions of the show bench, while its disappointments serve but to spur them on to greater achievements.

However, home gardeners should always remember that the varieties of flowers grown for show are not necessarily the best for decorating their own gardens. Many varieties look better on the bench than in the border, where they may disappoint by their sparse flowers, short season, or weakly habit.

Narcissi make lovely cut flowers. Among the old favourites the fragrant, many-flowered Grand Monarch, with cream and gold flowers, is one of the easiest to grow and best for cutting.

Value of Non-competitive Exhibits

Decorative displays of plants put up not for competition but for the information of the public can be rather more instructional, especially if they consist of really good garden, rather than show, varieties. Non-competitive displays are always worth careful study by the home gardener, especially if all the plants are clearly and correctly labelled, and would be of even greater value if the labels indicated the number of weeks during which the flowers, coloured leaves, or fruit remain attractive on the plants. All too often there are no displays of this type or they are put up purely for decorative effect without making any use of their educational value.

Exhibits of this sort, usually put up by nurserymen, are an important feature of all overseas flower shows, where gardeners often place their orders for plants during the show and the patronage of customers makes nurserymen keen to put up first-class exhibits. New Zealand flower shows could do with more trade exhibits, but nurserymen are likely to put them up only if they find the visiting public is prepared to do business with the exhibitors at the show.

Institute Gives a Lead

Meanwhile, the Royal New Zealand Institute of Horticulture has taken most welcome action in this question of recommending good varieties of plants for general garden use. As the climate, especially the amount of frost, differs greatly from one district to another, the district councils of the institute have each been considering the problem as it affects their own localities, and trying to choose a fairly-short list of trees, shrubs, herbaceous plants, bulbs, and other plants which are of outstanding merit.

SELECTING PLANTS FOR THE FLOWER GARDEN . . .

The institute emphasises that the plants are being recommended not as a result of their appearance on the show bench, or on some trial ground where conditions are particularly favourable to them, but because they do well and are worth growing in a wide variety of soils and situations in the district.

Prescription for Perfect Garden Plants

The "specification" for these recommended plants is that each should be:

Easy to establish in the district concerned, and reasonably quick-growing;

Reliable and regular in flowering, fruiting, autumn colour, or for whatever reason the plant is included;

Capable of making a worth-while contribution to the garden display for a prolonged period every year, and attractive even when not in flower or fruit so that it can "earn its place" in the smallest garden in which it can reasonably be accommodated;

Free from noxious habits such as undue seeding or spreading;

Not unduly subject to disfiguring or disabling diseases and pests;

Reasonably inexpensive to buy, and available for purchase;

Capable of growing in a wide range of soils and not requiring some special soil condition that home gardeners would find difficult to provide;

Hardy to the type of weather normally experienced in the district concerned.

This is an extraordinarily-searching criterion. It will not be surprising if few plants are considered to come up to this standard and, indeed, the institute suggests that the lists will at first be short. Though they will be added to from time to time, care will no doubt be taken not to include plants which will be disappointing, especially on small sections where there is no room for "passenger" plants.

Lists of plants recommended by two district councils of the institute are reprinted with this article and others will be published as they become available. The institute and its councils are doing home gardeners a very valuable service in sponsoring this scheme, which will help to avoid disappointments and should lead to an improvement in the standard of garden display in the Dominion.

Later the institute proposes to found an Award of New Zealand Garden Merit (A.G.M. (N.Z.)), for which plants will be assessed on a national basis by a special panel of judges who will consider the merits of the plants included in the local lists. A similar scheme operated by the Royal Horticultural Society in Britain has proved extremely popular and valuable. Some hundreds of plants have now received the coveted British Award of Garden Merit, judged purely on their performances in the border and not on the show bench.

An attractive, well-illustrated book, "Some Good Garden Plants" (London, Royal Horticultural Society, 1946, price about 11s. in New Zealand), describes the plants to which the A.G.M. was awarded during the period 1922-45. Though the book is well worth reading, it refers to plants selected for British gardens. No doubt the institute one day will publish a similar book in New Zealand, and also, perhaps, arrange for plants awarded the A.G.M. (N.Z.) to be grown in a national trial ground and given prominence in public gardens in each district.

Garden Work for August

Begonia and gloxinia tubers should now be started gently into growth by half-burying them in boxes of potting compost, sprinkling them with water, and standing them in a warm, sunny place, preferably in a glasshouse heated at night to prevent the temperature falling too low. Make sure that each tuber is sound and healthy, cutting out any soft or rotten places with a sharp knife.

Chrysanthemum propagation is an important item of work for August. Roots which have been left in the border from last year should be divided and replanted this month or next, as newly-planted chrysanthemums produce finer flowers than old clumps. Last year's stools which have been put in pots or frames to produce cuttings should be watered when necessary and cuttings taken as described with the illustration on page 100.

Cuttings can now be taken of lobelia, geraniums, iresines, heliotrope, and balsams growing in a glasshouse. The cuttings will root easily and provide useful young stock to plant out later in the year when danger of frost is past.

Dahlia propagation should now be started by putting the roots to be increased into boxes in frames, or on to the bench of a glasshouse, and packing them round with damp leaves or soil, which must not cover the tops of the tubers. In damp, warm conditions new shoots will start to grow from the tubers. The plants can then be increased by any one of several different methods, which will be described in detail next month.

Plants Recommended by the Taranaki District Council of the Royal New Zealand Institute of Horticulture

Evergreen Native Trees

Kowhai (*Sophora* (*Edwardsia*) *tetraptera*)
Mamuka tree fern (*Cyathea medullaris*) (tender to frost)
Pohutukawa (*Metrosideros tomentosa*) (tender)
Rimu (*Dacrydium cupressinum*)
Kauri (*Agathis australis*)
Puriri (*Vitex lucens*)

Evergreen Exotic Trees

Crimson gum (*Eucalyptus ficifolia*)
Magnolia grandiflora
Cedrus atlantica glauca
Chamaecyparis (*Cupressus*) *obtusa cripsii*
Australian silk oak (*Grevillea robusta*) (requires shelter)

Deciduous Exotic Trees

Magnolia campbellii
Paulownia tomentosa (*imperialis*)
Silver birch (*Betula verrucosa* (*alba*))
Liquidamber styraciflua
Copper beech (*Fagus sylvatica purpurea riversii*)

Exotic Flowering Shrubs

Beaufortia sparsa
Daphne odora (*indica*)
Azalea indica splendens
Magnolia stellata
Smoke bush (*Rhus cotinus folius purpureus*)
Leucospermum reflexum (open position)
Rhododendron fragrantissimum
Bottlebrush (*Callistemon citrinus splendens*)
Photinia glabra rubens
Chinese witch hazel (*Hamamelis mollis*)
Erica melanthera
Camellia japonica Edward Billing
Luculia gratissima

Flowering Bulbs

Narcissus Soleil d'Or
Lilium auratum
Freesia burtonii
Nerine fothergillii major
Scarborough lily (*Vallota purpurea*)
Lachenalias, various species
Lilium philippinense

Native Shrubs

Pink manuka (*Leptospermum scoparium martini*)
Pittosporum eugenioides variegata
Ramarama (*Myrtus bullata*)
Red kaka beak (*Clianthus puniceus*)
Golden tainui (*Pomaderris elliptica*)
Bronze ake ake (*Dodonaea viscosa purpurea*)
Veronica speciosa

Plants for the Rock Garden

Daphne cneorum
Lithospermum Grace Ward
Aethionema Warley Rose
Phlox subulata Camla
Helianthemum vulgare, various varieties
Gentiana acaulis
Heeria (*Heterocentron*) *rosea* (tender to frost)

Herbaceous Plants for the Flower Border

Gypsophila paniculata Bristol Fairy
Gerbera Jamesoni varieties
Dianthus Otaki Pink
Delphiniums, various varieties
Polyanthus, various varieties
Salvia patens
Scabiosa caucasica, various varieties
Helianthus quertifolius
Pyrethrum Crimson Glow
Japanese iris (*Iris kaempferi*)
Perennial phlox, various varieties
Rudbeckia herbstone

Annuals for the Flower Border

Phlox drummondii
Iceland poppy (*Papaver nudicaule*)
Zinnias, various varieties
Stocks, various varieties
Antirrhinums, various varieties
Nemesias, various varieties
Salvia splendens Harbinger
Petunia Rosy Morn

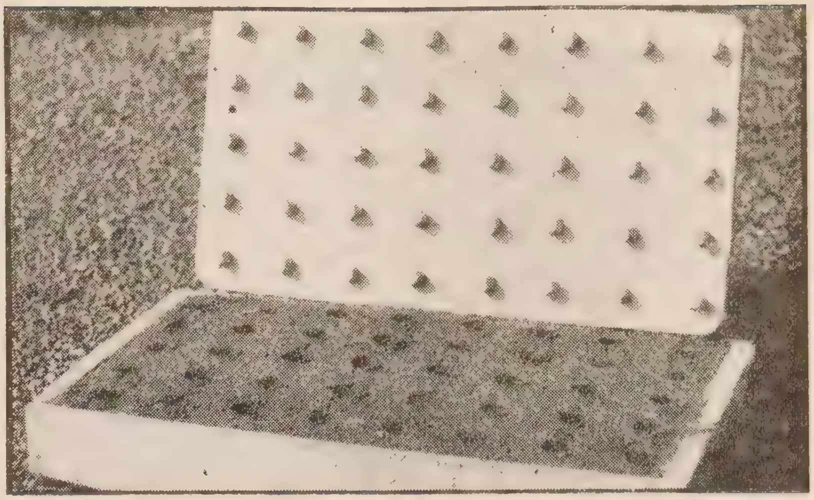
"Exotic" indicates that the plants come from overseas and are not native to New Zealand.

WORK IN THE FLOWER GARDEN

Fertilisers should be used regularly on the flower borders in all but the most fertile "recent" soils to get the best out of the garden. The most satisfactory system is to dress the whole of the borders each year in August with 2oz. a square yard of complete flower border fertiliser (three parts of blood and bone, two parts of superphosphate, and one part of muriate of potash). Full details of the dressing were given in the April, 1948, issue, with suggestions about reducing or withholding it in certain circumstances.

The dressing often produces astonishing results, especially in old town gardens, which have perhaps been gardened for 50 years or longer with little manuring. Measure up the borders now, obtain the ingredients, mix them, and apply the mixture evenly over the surface.

Fuchsias in pots, that have been rested through the winter, should now be brought out again, put in a warm, sunny window, and watered. When the buds start to grow the plants should be turned out of their pots, the roots shaken free of soil, and the plants re-potted into potting compost. Finally, prune back each plant to within an inch or two of its base to encourage strong new shoots to grow.



Plants grown from seeds sown in boxes last month in glasshouses or frames should now be large enough to handle and should be pricked out into other boxes to give each plant ample and equal room in which to grow. A board fitted with short pegs 1½ to 2in. apart can be used to mark the soil on top of the box.

Garden frames are so useful for a variety of purposes, and so increase the range of plants that can be propagated and grown at home, that no gardener should be without one. Even if a proper frame is not available, every garden should at least have a substantial wooden box, from which top and bottom have been removed, partly sunk in the soil to make it more stable and keep out cold draughts, and then covered at the top with a sheet of glass or a properly-constructed glazed framework—a garden "light." A frame enables plants to be kept moister, warmer, or drier than those in the open ground, according to their requirements at different times of the year.

Herbaceous plants should be set out as soon as possible if they are not already planted. Perennial phlox, heleniums, caucasican scabious (white and blue varieties), pyrethrums, and perennial asters (michaelmas daisies) of the amellus group are all free flowering and very suitable for the small garden. *Scabiosa caucasica* is one of the best perennials for cutting, providing a long succession of blooms each year. Plants are increased by being lifted, divided, and replanted in autumn or early spring.

Gladioli do best in a sunny, warm site, sheltered from very strong winds, and in deep, well-drained soils, but give poor results in shallow soils or hollows where water collects after rain. It is worth while going to some trouble to dig the ground deeply and provide gladioli with the best possible place in the garden, where their needs will be most nearly satisfied. If last year's gladioli suffered from any of the troublesome diseases described in the September, 1947, issue, planting

Plants Recommended by the Canterbury District Council of the Royal New Zealand Institute of Horticulture

Evergreen Native Trees

Lacebark (*Hoheria populnea*)
Southern rata (*Metrosideros umbellata (lucida)*)
Kowhai (*Sophora (Edwardsia) microphylla*)

Deciduous Exotic Trees

Prunus cerasifera pissardii
Magnolia kobus
Magnolia campbellii
Japanese crab (*Pyrus (Malus) floribunda*)
Purple crab (*P. f. purpurea*)

Plants for the Rock Garden

Mountain daisy (*Celmisia coriacea*)
Gentiana sino-ornata
Meconopsis betonicifolia (baileyi)
Primula cockburniana
Dianthus alpinus
Dianthus neglectus

Evergreen Exotic Trees

Cootamundra wattle (*Acacia baileyana*)
Arbutus menziesii
Crimson gum (*Eucalyptus ficifolia*)
Silver tree (*Leucadendron argenteum*)
Japanese cedar (*Cryptomeria japonica elegans*)

Annuals for the Flower Border

African marigold (*Tagetes erecta*)
Stock-flowered larkspur
Antirrhinum majus, various "intermediate" varieties
Clarkia elegans
Godetia, double varieties
Pot marigold (*Calendula officinalis*) Radio
Ten-week stocks (*Matthiola annua*), various varieties

Native Shrubs

Crimson manuka (*Leptospermum scoparium nicholsii*)
Pink manuka (*L. s. martini*)
Hebe (Veronica) speciosa
Notospartium carmichaeliae

Herbaceous Plants for the Flower Border

Tree poppy (*Romneya coulteri*)
Mount Cook lily (*Ranunculus lyallii*)
Perennial phlox, various varieties
Chatham Island lily (*Myosotidium hortensia (nobile)*)
Perennial asters (Michaelmas daisies), various varieties
Primula littoniana
Helenium autumnale Riverton Gem
Delphiniums, various varieties
Bearded iris (*Iris germanica*), various varieties
Red hot poker (Kniphofia) Dr. Thompson
Astilbes, various varieties
Gypsophila paniculata Bristol Fairy
Dahlias, various varieties

Exotic Flowering Shrubs

Azalea mollis, various varieties
Rhododendron fragrantissimum
Rhododendron Marquis of Lothian
Pieris (Andromeda) japonica
Forsythia intermedia spectabilis
Lily of the valley tree (*Clethra arborea*)
Spanish broom (*Spartium junceum*)
Red broom (*Cytisus scoparius* Burkwoodii)
Snowball tree (*Viburnum opulus roseum (sterile)*)
Viburnum carlesii
Osmanthus delavayi
Desfontainea spinosa

Flowering Bulbs

Lilium regale
Gladiolus, various varieties
Crocus, King of the Blues
Chionodoxa luciliae
Iris reticulata
Dutch iris, various varieties

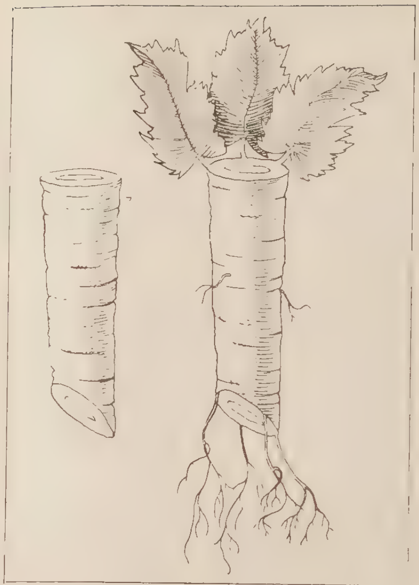
"Exotic" indicates that the plants come from overseas and are not native to New Zealand.

corms into the same bed again this year is asking for worse trouble. Look over the corms in store from time to time and burn any which show bad scars, rotten places, lumps, or scabs. Slight infections should be cut out with a sharp knife, but there is little chance of seeing them until the corms are "husked" (the outer skins pulled off) just before being planted. Planting can continue in very early districts, but the main planting is not usually made until September or October.

Herbs: It is curious that so many New Zealand gardens should be devoid of pot herbs. Is it that the housewives do not know of the many uses to which they can be put in cooking? The subject of herbs was covered very completely by A. G. Kennelly in the home garden notes in last month's "Journal." The plants should be near a path and, preferably, near the house so that the housewife can reach them easily even in wet weather.

Hydrangeas in pots should now be started into growth by being put in a warm, sunny place and watered. When growth starts the surface soil should be scraped off and replaced with a layer of new compost with which has been mixed a teaspoon of complete fertiliser for each pot.

Lawns newly sown last autumn should be mown only with the blades set well above the surface. The level of cut can be lowered gradually later as the lawn becomes better established. In the "spacious days," when there were plenty of gardeners to be had for private gardens, the mowing machine was not used at all for the first few cuts, which were always taken off by hand with a scythe. That was considered better for the health of the young plants, but probably few professional gardeners now (and even fewer home gardeners) could cut a fine lawn closely with a scythe, which is becoming another of the lost arts.



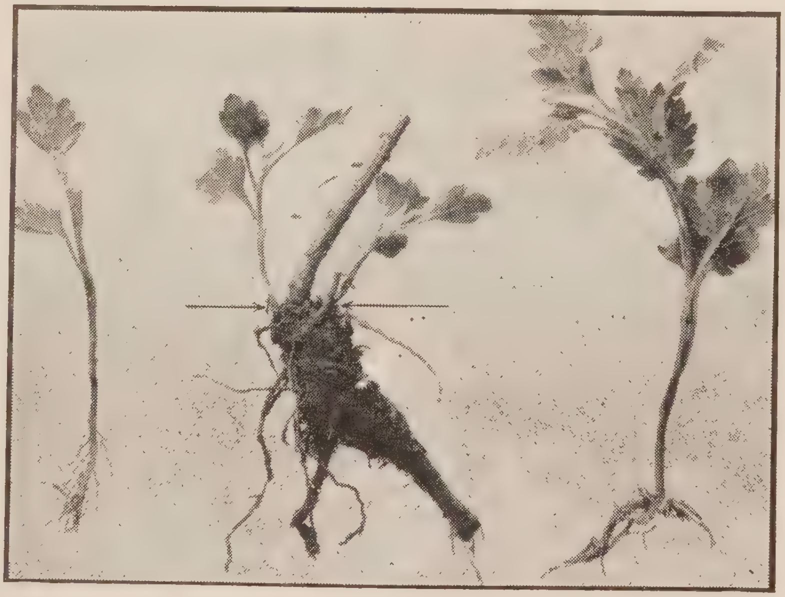
A root cutting of Oriental poppy. The top is made square and the bottom slanting. If more than one shoot grows, they should be reduced to one.

Plant pots are bone dry when bought and it is essential to soak new pots thoroughly in water and then allow them to dry superficially before they are used. Pots which have been used before should be sterilised by bringing them to the boil in water and cleaned by scraping them with an old knife and brushing vigorously to remove all traces of "fur," green incrustation, and old soil. A plant potted up into a dirty pot cannot be turned out again without damage to the fine roots, many of which will stick to the lumps of dirt on the pot and be pulled off as the plant is turned out.

Pruning shrubs can be puzzling work for the home gardener who does not understand clearly the purposes of pruning. Shrubs which will flower next summer on new shoots should be pruned hard now to keep them shapely and encourage plenty of new growths. Shrubs in this group include *Spiraea japonica* Anthony Waterer, *Buddleia variabilis* (*davidii*), *Spartium junceum, Hydrangea paniculata* (but not the common garden hydrangea), deciduous ceanothuses, coloured-barked willows, ornamental raspberries, dogwoods, coral tree, bush roses, and *Clematis jackmanii.* Home gardeners with a considerable number of shrubs will find it worth while to get a copy of a good book on pruning. "The Pruning of Trees and Shrubs," by W. Dallimore (Oxford, Dulau, 1945, about 11s. 9d. in New Zealand), can be thoroughly recommended.

Root cuttings can be used to increase stocks of paeonies, oriental poppies, gaillardias, and anchusas. For this interesting method of propagation dig up established plants in autumn or late winter and cut pieces of root 2 to 3in. long and as thick as a pencil or thicker. Root cuttings should always be cut off square at the top and slanting at the bottom so that one end can be told from the other at a glance.

Propagating Chrysanthemums



YOUNG shoots arising from just below the soil make the best chrysanthemum cuttings. Two shoots, suitable for cuttings, are shown in the centre growing from a chrysanthemum stool—the root of a plant that flowered last year. Each shoot should be cut just below ground level where shown by the arrows when 2 to 3in. long, the bottom two leaves removed, then the end of the stem cut off neatly with a sharp knife or razor blade just below where the lowest leaf joined the stem. Dibble the cuttings 2in. apart and not more than 1in. deep into light, sandy soil in a frame or in seed boxes stood on the bench of a glasshouse. Water them in and cover them with a sheet of newspaper for a day or two to prevent the cuttings from flagging. Most of the cuttings should be showing signs of growing in two or three weeks.

The plant on the right shows a rooted cutting. Nearly all the roots spring from the cut surface at the bottom of the stem.

On the left is a shoot which already had roots when removed from the parent stool—an "Irishman's cutting." In this case roots are developed at intervals for some distance up the stem as well as at its lower end. This type of shoot is best planted separately from the cuttings, as it grows more rapidly and will soon overshadow neighbouring unrooted cuttings.

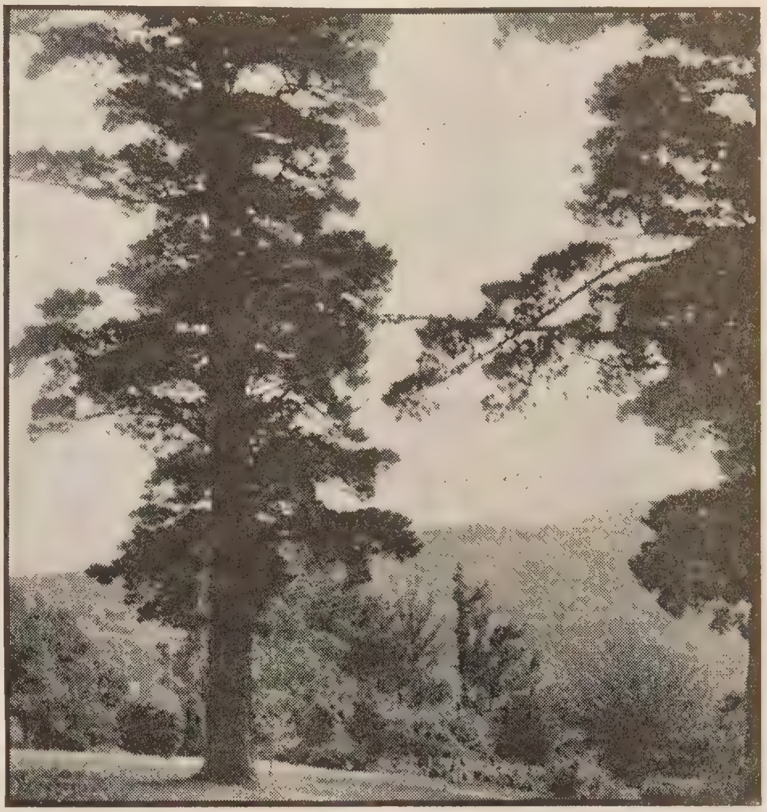
Put the cuttings upright a few inches apart in boxes of good compost or in a sandy, open soil in a frame, setting them so that the top of each cutting is just below the surface. The cuts soon heal, roots grow from the bottom, and one or more shoots appear at the top. The plants are then ready to plant out, all the shoots but one being removed if several have grown.

Sloping banks and borders often do not get their proper share of winter rain, which tends to run off the surface. A few shallow nicks cut in the soil across the slope will ensure that rain soaks in instead of running off and will check any tendency toward erosion of soil.

Sow flower seeds under glass in boxes to produce bedding plants for setting out in October; salvia bonfire, *Phlox drummondii*, petunias, *Begonia semperflorens*, lobelias, stocks, antirrhinums, sweet wivelsfield and other hybrid dianthus species, *Primula sinensis*, verbenas, nemesias, African and French marigolds, and zinnias are suitable. For gardeners fortunate enough to have a greenhouse with some form of heating, the best temperature for raising seedlings of all these plants is between 60 and 70 degrees F. Most of the seeds listed can be grown in a cold frame without heat, but in that case it is best to delay sowing for a few weeks.

Sterilise loam, boxes, pots, and other equipment in preparation for their use for seed sowing, pricking out, and potting. Early spring is a busy time for gardeners, especially those with a glasshouse who raise their own bedding plants, but it is best not to sterilise these items until just before they will be needed to reduce the risk of their being contaminated again after sterilisation. Full directions about the choice and sterilising of soils, mixing composts, sowing seeds in boxes, and pricking them out were given in articles in the July and August, 1947, issues of the "Journal." Small quantities of soil in "potting condition" can be sterilised perfectly well in the oven, spread in meat tins in even layers not more than 3in. thick. The temperature should be tested from time to time, using a dairy thermometer, and the soil can be considered sterilised when its temperature reaches 180 degrees F. in the centre of the layer.

REMEMBER ARBOR DAY



[*Jack Welsh and Sons photo.*

On the first Wednesday in August New Zealanders have a special opportunity of repaying something of their debt to those who long ago planted the trees of which this generation is now reaping the benefit. Planting well-chosen trees in suitable sites on Arbor Day is a good way of contributing to the future amenities of New Zealand, where all too many places lack the quiet and restful background that well-grown trees can give.

[*Green and Hahn Ltd. photo.*

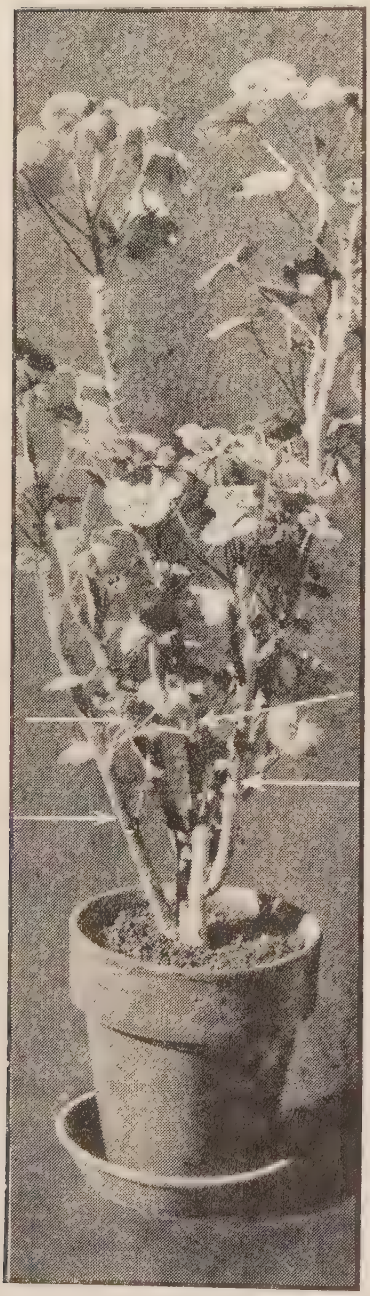
The busy season for sowing and pricking out seedlings is now beginning and the necessary supply of seed boxes should be got ready in plenty of time. The exact size of boxes is not important to the home gardener (though commercial growers prefer them to be uniform), but they should not be deeper than 4in., and preferably only 3in., as it is difficult to remove plants from deep boxes without causing serious damage to their roots. There should be sufficient gap between the bottom boards to allow surplus water to drain through even when the wood has swelled.

Recent research in England has shown that correct temperature control is more important than had been realised previously and that over-heating can be a disadvantage. Every gardener should have a thermometer suitable for this purpose.

Sweet peas can continue to be planted out, 6 to 15in. apart, the closer spacing where the row is being grown for a bold display of colour and the wider spacing if the peas are to be trained as cordons. Arrangements must also be made for supporting the row, using stout posts every 10 to 12ft. and wire netting, sheep netting, manuka brush, or other supports fastened to wires strung near the ground and along the tops of the main supports. (Details of these methods were given in the December, 1947, issue.) Whichever system is used, it must be soundly carried out to stand up to the worst gale likely to occur during summer,

WORK IN THE FLOWER GARDEN IN AUGUST

PRUNING AN OVER-GROWN GERANIUM



Pot geraniums which grew leggy with last year's flowers should now be pruned hard, repotted into new potting compost, and put in a warm, sunny window to start off again into growth. The arrows indicate the level to which an overgrown plant should be cut back.

[*Douglas Elliott photo.*

The Chinese yulan or lily tree *(Magnolia denudata (conspicua))* is a showy deciduous magnolia, which flowers in late winter, with large, pure white flowers, sweetly scented and borne on the bare branches before the new leaves grow.

when a well-grown row of sweet peas presents a large area to the wind.

Other Tasks for the Month

Dead flower heads should be cut off **anemones** to prolong flowering.

Sow **annuals** which do not transplant well, such as linaria, candytuft, and mignonette, outdoors, but only in mild districts.

In early districts start planting **bedding plants** out of boxes.

Prick out seedlings of **cyclamen** and **gloxinias** into pots or boxes as soon as they can be handled.

Divide and repot **ferns.**

Early shoots of herbaceous plants such as **lupins** and **delphiniums** can be cut off and rooted to increase the stock.

Lift and pot more **polyanthuses** or **primroses** to replace those going out of flower.

Prune **roses** in very late. cold districts.

Planting of **shrubs** should be concluded; nurserymen are likely to have sold the best of their stock by now.

Reminder About a Common Trouble

Damping off is the most troublesome disease of small seedlings. It is caused by a fungus (*Pythium de Baryanum*) which attacks young plants, invading their stems just above soil level and causing them to topple over and die. The disease spreads rapidly from one plant to the next, so that the seedling first attacked is soon surrounded by a growing patch of more dead seedlings. The fungus is spread by fine threads (hyphae) which can just be seen with the naked eye, ramifying in all directions from affected plants. Good cultural conditions can do much to prevent trouble from damping off. The disease is most common and troublesome where seedlings or young plants are overcrowded, as this results in soft, sappy growth and weak stems which are specially susceptible to attack. Thin sowing of seeds and early pricking out of seedlings will do much to prevent damping off. The use of sterilised compost is the other major factor in prevention, as infection usually comes from the soil.

However, damping off sometimes occurs even in sterilised soils. At the first sign of damage the affected groups of seedlings, together with those for an inch or two around. should be carefully lifted out of the box and burnt. The remainder should then be watered with Cheshunt compound, which can be bought made up ready for use or made by mixing two parts by weight of pulverised copper sulphate with 11 parts of ammonium carbonate. Allow the mixture to stand for 24 hours in a tightly-corked bottle, and then use it at the rate of 1oz. dissolved in a little hot water and made up to 2 gallons with cold water. Apply as quickly as possible, using one quart a square foot of surface.

As a further precaution against damping off, especially if unsterilised soil is being used or the seedlings are particularly valuable or vulnerable to attack, the box of compost should be watered thoroughly with Cheshunt compound before the seed is sown and again sprinkled lightly with it after the seed has been covered with soil. A moist, warm atmosphere is most conducive to an attack of damping-off disease. and these conditions should be avoided when raising seedlings, which will, in any case, make the strongest plants if grown fairly cool.

SEAMS WITH THE PROFESSIONAL LOOK

POORLY-MADE seams label clothes "home-made." To produce a garment of which to be proud, it is essential to make seams which have a good appearance and will wear to the end of the life of the garment. Making a satisfactory seam begins with the cutting and ends only when the last pressing is given. This article by Edith G. McNab, Rural Sociologist, Dunedin, offers advice on making seams and on the choice of a type of seam to suit the garment and the material.

[*Sparrow Industrial Pictures Ltd. photo.*

CUT the garment out very accurately, avoiding nicking the edges of the fabric. Hold the shears with the blunt end uppermost, sliding the pointed blade along the table without lifting it until the end of the cutting line is reached. Do not cut to the extreme end of the blades, but stop when nearing the tips and slide the shears along for the next cut.

Pinning

Pinning is easiest to do when the pieces of material are lying flat on the table, unless one piece has to be eased on to another, when the two pieces may be held in the left hand, curved over the back of the fingers, with the piece to be eased held slackly on top and the lower piece kept taut. Always pin before tacking or basting, to make sure the pieces fit together and any fullness is evenly distributed. Putting the pins in at right angles to the seam line is better than placing them in the same direction as the seam—fullness is more easily distributed, basting is easier, and the heads of the pins are at the edge of the material ready for removal. Though the general rule is to baste all seams, a very experienced sewer, who may not baste an ordinary straight seam, will find pins placed in this fashion are more easily removed during machine stitching.

Basting

Basting is best done with the work on a table. If any sections are likely to stretch (for example the neck), run a line of tacking or machine stitching round them to prevent their being pulled out of shape. As in pinning, when any easing is to be done hold the full side uppermost. If the first basting stitch after inserting the knotted thread is a backstitch, there is no risk of the end of the thread being pulled through the material. A long needle is more economical of time and effort than a short one when tacking, for several stitches can be made before the needle and thread are pulled up.

Always baste, and later stitch, from the top of a seam downward and from the inside outward—that is, from underarm to hem and from neck to the outside shoulder. As a rule it is best to finish the lengthwise seams before joining the garment at the waist or putting in the sleeves.

Do any gathering with a double thread, beginning with a knot and a backstitch and putting in two rows of even, small, running stitches, one row just outside the seam line and the other ¼in. nearer the raw edge. Begin both rows at the same end and pull them up together, as shown in Fig. 1. The double row of gathering threads gives better control of the fullness than a single row. If the tension is loosened and a long stitch used, the two rows may be put in by machine.

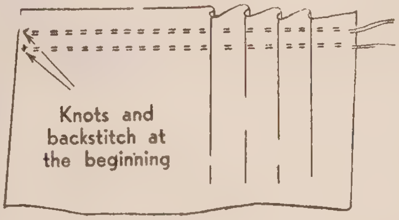


Fig. 1—Gathering. The first row of stitches is just outside the seam line and the second ¼in. nearer the edge. Pull up the two sets of threads together.

Machine Stitching

Use the correct thickness of thread and the right size of needle for material to be machine-stitched. Sewing-machine manufacturers usually provide information about sizes of thread and needles to use for different types of material in the booklet accompanying the machine. The needle should be sharp; it can be resharpened if necessary. Thick fabric needs a larger needle, a thicker thread, and a longer stitch than a fine material. Try the stitching with the correct thread and needle on a doubled scrap of the same material as the garment, and make sure the tension is perfect, with the lock stitch forming in the middle of the two pieces of material, before beginning on the garment. Again, refer to the instructions in the manufacturers' booklet if there is any doubt about adjusting the tension.

Before starting to sew always push both threads behind the presser-foot, the top one passing between the prongs of the foot. This prevents the ends of the thread becoming tangled in the first inch or two of stitching. When turning a corner stop with the needle in the fabric at the corner, lift the presser-foot, and use the needle as a pivot on which to turn the material; that ensures that the fabric cannot slip out of place during turning. During machine stitching any eased fabric should be underneath so that the feed dog of the machine may carry it along. Stitch the seam an even distance from the raw edges.

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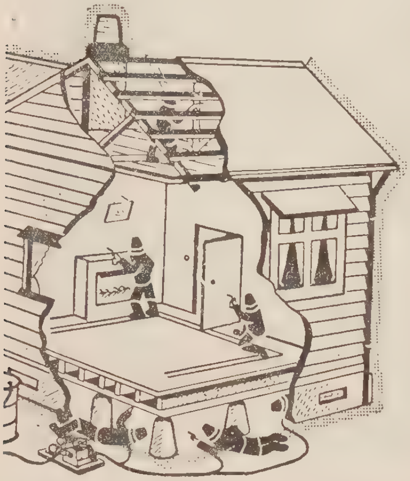
To kill existing borer in infested timber, deep penetration is required—the equivalent of at least 4 flowing brush coats per 1in. of thickness. Grubs burrow deep in the timber and it is always better to apply too much than to nullify treatment with too little.



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CLAIMS TO TREAT WITH "A FEW GALLONS" ARE ABSURD. This is obvious when it is realised that the timbers in a 1000 sq. ft. floor and understructure represent a stack 10ft. x 5ft. x 3½ft. That's a lot of timber and it requires 35 to 40 gallons of toxic, depending on the severity of attack. Yet, because of their specialised equipment and trained operators, Boracure can apply the large quantities necessary for protection at a price that is usually below that quoted for ineffective work!

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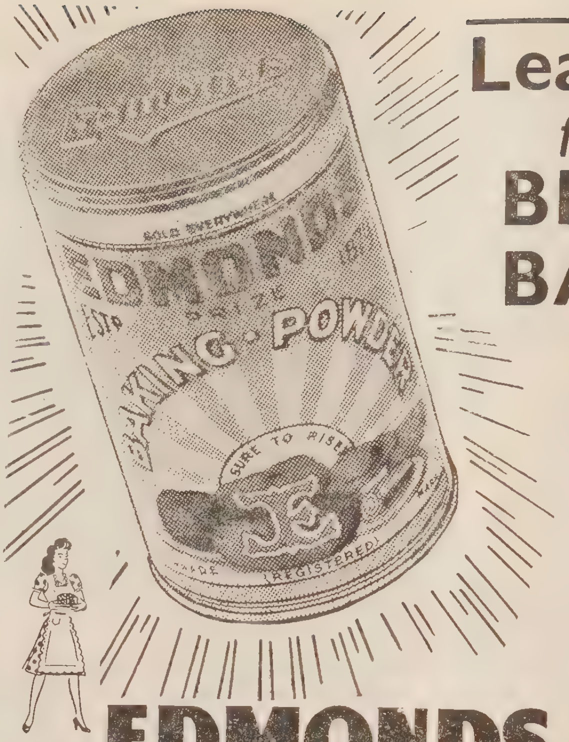

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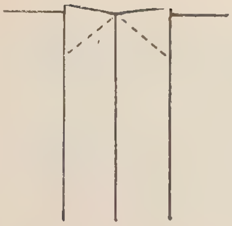

Fig. 2—Trim off the corners of the seam allowance by cutting along the diagonal dotted lines.

After the machine stitching is done remove the basting threads, cutting them every few inches for easy removal with less risk of marking the fabric.

Finishing Seams

The general rule is to finish lengthwise seams first except when joining shoulder or skirt yokes. A seam must be completely finished, including pressing, before it is crossed by another seam. To make the ending of the seam more inconspicuous, the corners of the seam allowance at the end of the seam may be cut off (Fig. 2).

A curved seam must be clipped from the raw edge in toward the stitching before it can be pressed to lie flat. If the curve is concave, clip in not quite to the seam line, taking care not to cut the stitches (Fig. 3). If it is convex, cut V-shaped pieces out of the seam allowance (Fig. 4).

Trim the seam allowance away on corners of collars and similar places, so that when turned to the right side the corners are flat, not bulky (Fig. 5).

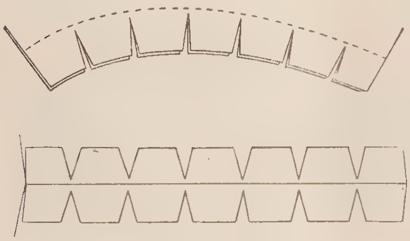

Fig. 3—Clip the seam allowances of a concave curve in from the raw edges almost to the lines of stitching before attempting to press the seam. The lower diagram shows the seam pressed open.

In pressing, if both raw edges are to be turned one way, turn them toward the more curved parts of the body. The upper part of the armhole seam is turned over on to the body, but the lower part (between the notches on the pattern) is allowed to stand upright under the arm. Press seams by running the iron in the direction in which they were stitched—from the top downward and from the inside outward.

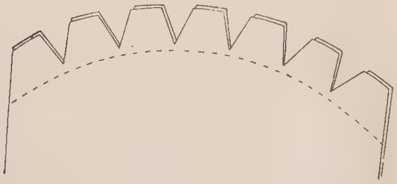

Fig. 4—Cut notches out of the seam allowances of a convex curve to make the seam lie flat when pressed open or turned over.

Choice of a Seam

The type of seam selected depends on the style of the garment—whether the seams are straight or curved, whether it is to withstand frequent washing, and whether the seam is to be decorative or only structural—and on the material—whether it is thick or thin, and whether it frays readily.

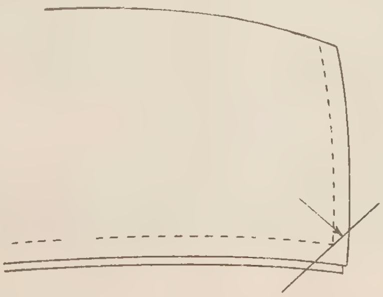

Fig. 5—To prevent a bulky corner on collars, cuffs, or facings, cut off the corner of the seam allowances at the line indicated before turning the corner right side out.

Plain Seam

The plain seam is too well known to need description. It may be pressed open or closed. The seam is flatter if the edges are pressed open, but that is better not done if the fabric is sheer. A plain seam with untreated edges may be used for firmly-woven fabrics which do not ravel or for garments such as coats which are to be lined. It is flat and inconspicuous.

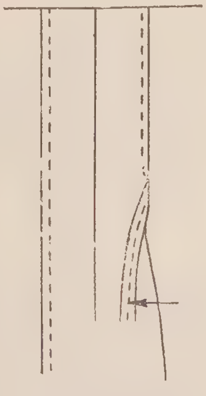

Fig. 6—Hemmed seam. The raw edges of a plain seam are turned under once and a row of machine stitching made close to the folded edge.

The raw edges of a plain seam may be finished by:—

Pinking, which should be used only if the fabric does not fray. It may be used for some woollen dresses and for afternoon or evening frocks, but it is better to avoid pinked seams for washing dresses unless the material really does resist ravelling, even after many washings.

Hemming (Fig. 6): The raw edges of the plain seam are turned under separately and stitched close to the folds with a machine. Lightweight materials—light dress woollens and cotton washing fabrics—should be hemmed.

Overcasting (Fig. 7): The edges may be overcast singly or together. They are better done singly if the material is thick, so that the seam may be pressed open and will be as flat as possible. The overcasting stitches should be ⅛in. deep and the same distance apart. Usually two or three stitches may be taken before pulling up the thread. This is a good finish for heavier fabrics.

Binding: Bind the two edges of the seam separately. Commercial bias binding may be used, but net is good, as it is less bulky. This finish is suitable for thick materials and for unlined coats.

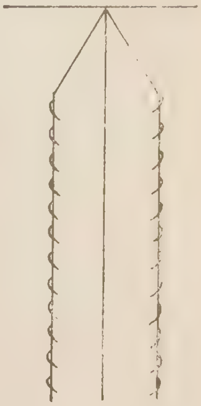

Fig. 7—A plain seam pressed open, with the raw edges overcast by hand. Make the overcasting stitches ⅛in. deep and ⅛in. apart.

Double-stitched Seam (Fig. 8)

Make an ordinary plain seam, then make a second row of stitching about ¼in. from the first, measuring from the first row toward the raw edges. Cut off the raw edges close to the second row of stitching, and overcast if the fabric ravels. Use this seam for semi-transparent or sheer materials, such as voiles.

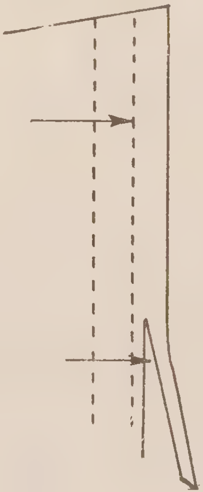

Fig. 8—A double-stitched seam. A second machine stitching is made about ¼in. from the first. Cut off the edges close to the second stitching. Overcast if the material frays.

Flat Fell Seam (Fig. 9)

First make a plain seam with the correct seam allowance on both pieces of the material. (If one edge is arranged to protrude over the other, the correct seam allowance is not being taken up and the fit of the garment is altered.) Cut off one edge to within about 3/16in. of the stitching, then turn the other raw edge in and fold the turned edge over to lie flat and cover the trimmed edge. Take care that both sides of the seam are flat, and that the width of the seam is even and not more than ¼in. across, unless made in thick material, when it may be wider. Make a second machine stitching close to the folded edge, from which no threads should protrude. This seam may be made on the right side of the garment, particularly if the garment is tailored—that is, the first stitching is made

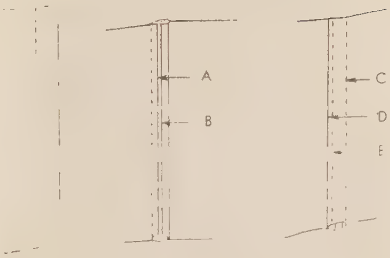

Fig. 9—The flat fell seam. Left: Make a plain seam on the right side of the fabric, taking up the usual seam allowance. Centre: A, one edge trimmed to within 3/16in. of the stitching; B, the second edge turned in. Right: C, the first machine stitching; D, the second edge (with turning) laid flat on the garment; E, the last row of stitching, made right through three thicknesses close to the folded edge.

with the wrong sides of the material together. It can also be made on the wrong side of the garment.

The flat fell type is a strong seam, with all edges finished. It is particularly suitable for garments such as shirts, blouses, pyjamas, and children's clothes. It will stand up to endless tubbing.

French Seam

Begin this seam by placing the wrong sides of the pieces together. Make a row of stitching about half the depth of the seam allowance. Cut off the raw edges close to the stitching. Turn to the other side, and make a second row of stitching to take up the remainder of the seam allowance and to cover the raw edges. There must be no threads protruding from the finished seam, and the seam should not be much more than ⅛in. wide when finished.

This seam is used for transparent fabrics, but it cannot be used for fitted garments when the seams are curved. It makes too thick a seam to be used on any but the sheerest fabrics.

Lapped Seam (Fig. 10)

Fold the edge of one piece for the whole seam allowance, and lap this piece over the other. This is most easily done with the pieces flat on the table, wrong sides uppermost. Pin them, then turn to the right side and baste them. Stitch them an even distance from the fold. By using a greater seam allowance and stitching, say, ¼in. from the edge this is made into a tucked seam.

A lapped seam must be flat, with no bulges. It is used to join yokes or as a decorative seam.

These seams are the ones most used, and a knowledge of the construction and accepted standards for the appearance of the finished seams will give the amateur dressmaker something on which to base her choice when deciding how to join the pieces of a garment together. The beginner should remember that time spent in careful pinning and tacking is not wasted, but rather should be regarded as time well spent. If a new seam is being made for the first time, try it on a scrap of the material before using it on the garment.

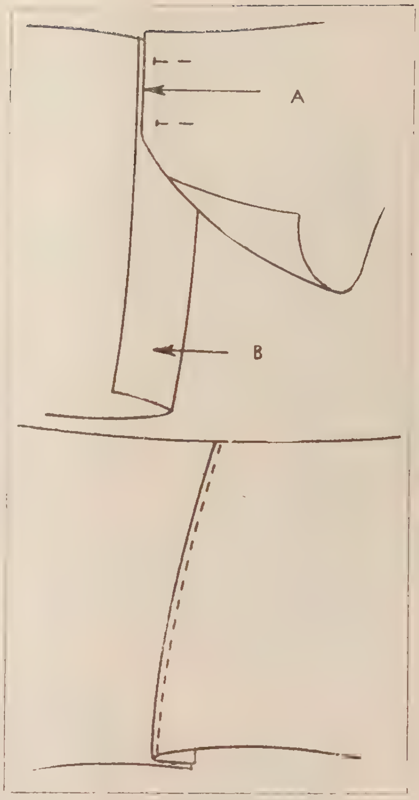

Fig. 10—Lapped seam. Upper (wrong side): A, the second piece lapped over the first to the depth of the seam allowance; B, the edge of one piece turned in for the depth of the seam allowance. Lower: The right side of the finished seam.

Avoid Food Poisoning

The Food handler — in the *home* and in the *factory* — should be thorough in personal cleanliness. The fingers of the food handler are the most likely way of contaminating food. Before a food handler starts work the hands should be carefully washed and dried on a clean towel *kept for that purpose only*. Other people eat the food prepared. They depend for safety on hand cleanliness, and the avoidance of unnecessary touching of food by workers and consumers.

Food must be protected from disease germs that gain access otherwise than from hands, such as through someone coughing or sneezing over it, or by the dust in the air, or by flies and cockroaches, or by rats and mice.

Any multiplication of disease germs that do gain access to food *must be minimised by keeping food cool.* Left overs, types of foods suited to germ growth such as custards, fillings, milk puddings, spanish cream, cooked meats and ham, should be handled with special care and stored in icebox or refrigerator or somehow kept cool. The warmth of the kitchen or ordinary cupboard promotes growth and invites trouble; continuous coolness is needed for safety.

Thorough cleanliness, and a proper dishwashing procedure to kill germs, for all food and cooking utensils is essential to reduce the chance of food poisoning. Food containers, bins, ice chests, refrigerators, meat safes, etc., require scrupulous cleanliness also.

Food handlers in these ways can protect others from food poisoning.

(This is the first of a series of advertisements issued by the Department of Health in the interests of safe and clean food handling).

For Health's Sake Keep Food Safe

FH1

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FRIENDS

It is my joy in life to find
At every turning of the road
The strong arm of a comrade kind
To help me onwards with my load.
And since I have no gold to give,
And love alone must make amends,
My only prayer is, while I live:
God make me worthy of my friends!
—F. D. Sherman.

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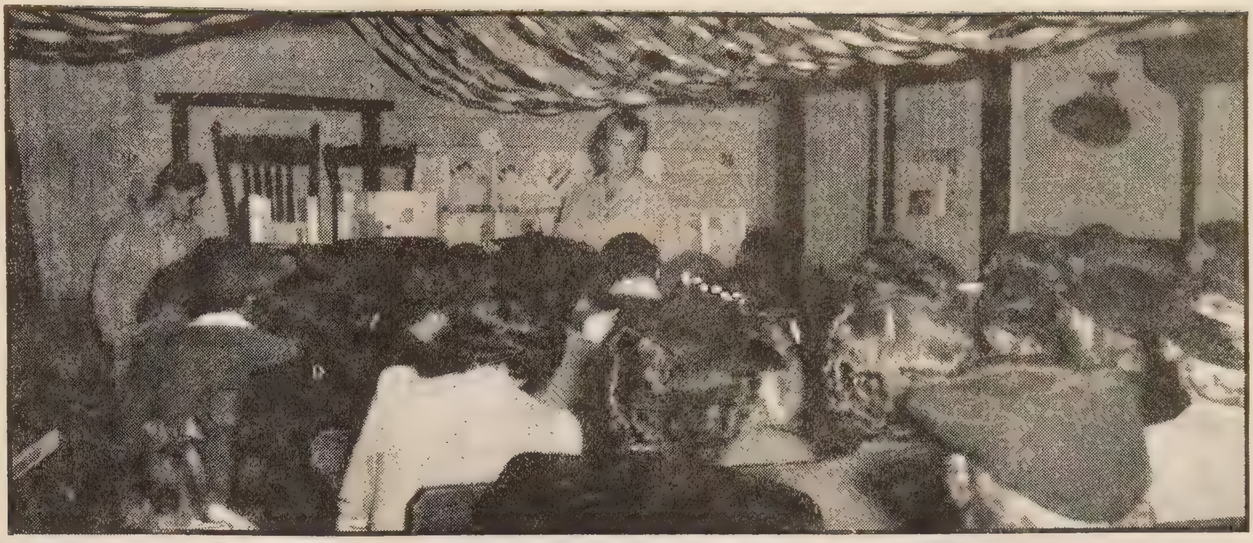


ORGANISATIONS FOR WOMEN AND GIRLS

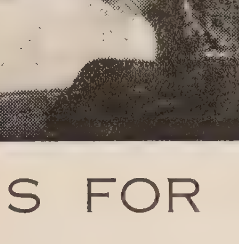
By EIRENE UNWIN, *Rural Sociologist, Dunedin.*

WHEN a woman or a girl decides to join some organisation that caters only for women, what are her reasons likely to be? Does she expect only to find something there, to gain some knowledge or learn a new craft, to meet new friends and enjoy the company of others, or does she also join that she may give—that she may be in a better position to serve the community in which she lives? Whatever her motive, and usually it is a combination of these two, once she has joined, willy-nilly she finds herself part of a group; her life is altered whether she recognises it or not, and it may be immeasurably enriched.

WHAT is there about group life that is so different? What is the difference between the people of a district meeting in a picture theatre and the same people meeting in an organised group for some special purpose that interests them all? Surely it is that at the pictures they are just a number of separate people who happen to be together at the same time and place for a purpose quite outside themselves, not depending on each other for their entertainment; in the second case they have real contact with each other—they learn from and give to others. They are no longer a disorganised group of separate people; they have become a community.

Companionship

It is not proposed to deal with groups meeting entirely for business purposes, but rather with those of which the most important element is the opportunity given their members to find and give companionship and to enjoy the social life they would otherwise miss. This kind of group is especially valuable to country women and girls. Some groups may run a drama club, a choir, or a sports club; others may organise classes in handicrafts, demonstrations in homecrafts, discussion groups, or courses in nutrition; still others may act as parents' meetings or parent-teacher groups, with special emphasis on the welfare of children and their development. Field days or excursions, too, may be organised. But all these activities bring women the opportunity of thinking, working, and enjoying new experiences together.



Whatever bias their activities may take, or whether they provide a combination of many, the core of these organisations is the regular monthly or fortnightly meeting. Out of this all other activities develop. It is important that these monthly meetings be well organised and planned to cater for all tastes, and though the exact pattern of the organisation may vary, as may the pattern of the meetings, certain rules help any group to run its meetings well.

Programme Planning

A committee, or the whole group if it is small, should plan the programme ahead for several meetings or, better, for the whole season or a year. This is very important, because if it is not done, very likely it will be found at the end of the year that no one has learnt very much and nothing of permanent value has been accomplished. Plenty of time for making the arrangements gives more opportunity of obtaining the people the group wants to speak, demonstrate, or entertain, and a programme planned a year ahead means that topics can be arranged in an orderly way instead of being haphazard. Widely-organised groups may print their programmes for a year so that all members have a copy; then no member has an excuse for not knowing what her group is doing and when.

Programme planning is not a small task, and suggestions for the next season should be collected from members throughout each year. When sorting and arranging these the three principles of quality, variety, and activity should be remembered.

Talks should be valuable and interesting, demonstrations should be on worth-while topics, songs should be chosen with care, plays presented should be worth acting, tasks undertaken should be of real service. All a group's doings should bear the hallmark of quality if the group is to be worth while. The tastes of all members should be catered for, from the youngest to the oldest, whether those tastes be mainly practical, artistic, or intellectual, outdoor or indoor, for public or family affairs. Opportunity should be given all members to take at least some active part at each meeting. No programme is entirely satisfactory if any member is allowed to go home without having contributed her share to the meeting's success.

Each meeting should contain three parts, business, special, and social. These are not always clearly separated in fact, but all should be kept in mind by those who plan the programme.

Business

In order that the organisation may do the work it finds to do efficiently and well, business must be transacted at each meeting. Briefly, the agenda of this part should include the following, usually taken in this order:—

Apologies.

Reading of the minutes of the previous meeting.

Confirming or correcting and signing of the minutes.

Discussion or business arising out of the minutes.

Correspondence; accounts for payment.

Reports, if any.

Special and general business.

The group will need a chairman or president, a secretary, and possibly also a treasurer; in smaller organisations the secretary is frequently the treasurer in addition; or when members are mostly young and inexperienced two may act together as joint secretary-treasurers. These officers are usually elected for a year at the annual general meeting, when a vote is taken among nominated members by all the members of the group. These officers should not be chosen just because they are popular, or for any other irrelevant reason, but because they are thought capable of fulfilling the task well.

As well as these officers, in all but very small groups a committee is necessary to do the organising and executive work of the group. The other members of the committee are also elected at the annual general meeting. Their number varies with the size of the group, but more than about 12 make the committee a little unwieldy. Six to ten is usually a good number. If the group is for girls, and not for both women and girls, it is advisable that the group seek the aid of one or two experienced older women of the community to attend meetings and to act in an advisory capacity, not as executive officers. A girls' group can gain immeasurable assistance from such senior folk, and yet in no way should it be said that the girls are not running their own club.

The Constitution

Before any new group has been in existence very long it should draw up a constitution, unless the group is a branch of a larger organisation which already has a constitution, in which case the group should have a speaker explain the constitution, or at least summarise it, at one of its early meetings, for the constitution sets down clearly both the aims of the group and the machinery set up for reaching them. If the group is new and unaffiliated to any other organisation, drawing up a constitution will force its members to clarify their ideas about why they have formed the group and the way in which they want to go about their activities. A constitution should not be worded so that it is permanently binding. It should always contain a clause providing for its alteration if that is deemed advisable by a large majority of its members. The constitution of an already-established organisation with somewhat similar aims or set-up may well be used as a pattern for the new constitution.

The Special Aspect

The main part of the meeting, the special aspect, is frequently educational in character, though it may be recreational or take the form of all members joining in some piece of work or social service. It will vary with the group and the purpose for which it is formed. Together with the important social aspect, the special part of each meeting embodies the main purpose of the group. From this part, perhaps above all, other activities of the group develop, and this part gives meaning to the business and the work of the committee. In its educational aspect it gives country women the chance to learn new skills, gain new information, and widen their ideas; it can introduce them to whole new aspects, tell them of the ways of living of people in different lands, or even of people in their own land but in situations different from their own.

Through all this the members find their own lives enriched, and that enrichment spreads back through them to their homes and families, or on through their representatives to wider community activity or social service. The individual, the home, the community, the nation, even the world, can benefit when women organise themselves into groups for purposive action.

Social Activities

The social part of each meeting contributes in no small measure to the enrichment of the lives of members. It gives them relaxation, recreation, and frequently an opportunity for active participation in the meeting less readily provided by the educational part. On the other hand, if the rest of the meeting has involved activity, this part can take the form of passive recreation. Programme planners should use the social part judiciously. It can always provide variety and activity, and should always maintain the principle of good quality.

The chief thing to remember in planning the social part is that it should include everyone, drawing into the fellowship of the meeting any to whose tastes the business or special part may not have appealed. It should be essentially recreational—that is, refreshing.

While enjoying a cup of tea, members very often have opportunities for chatting with friends whom they may meet only once a month at meetings. This period of informal friendliness is important in the social part of the meeting, but rarely should it be the only item, and a list of suggestions, by no means inclusive, is given for other items which can well be used to the benefit of all. What is to be done in the social period should be planned as carefully as the rest of the programme and at the same time. Arranging the details of organisation at each meeting can well be the work of a sub-committee, or of a few members chosen at each meeting for the next. It should not be left until the last minute to decide either what is to be done or how members are to do it.

The main social activities can be listed under the following headings: Roll-calls; music; dancing; acting, reading, and story telling; games and competitions; exhibitions, competitive and otherwise; and intergroup activities.

Roll-calls

Roll-calls are a straightforward method by which all members make some contribution to the meeting. They may be grave or gay, they may follow up a topic from a previous meeting or introduce new material, and they may be carefully thought up beforehand or the subject announced at the meeting and everyone's contribution quite impromptu.

Here are some ideas for roll-calls:—

For fun: The most frightening moment of my life; the silliest thing I ever did or saw; my pet superstition; the best pennyworth I know; children's sayings or doings; the tallest story I ever heard; how to be happy though married (or unmarried).

To share information: Spring-cleaning hints; kitchen conveniences; a new recipe; how my head can save my heels; winter evening occupations; occupations for the children on a wet day; household hints for hot weather; ideas on furnishing renovations. More of these can be chosen to follow up topics or talks or demonstrations given at earlier meetings.

To share ideas: Why I joined this group; suggestions for next year's programme; what this group could do to improve the community amenities, to help the people of Europe, to encourage immigration, for a family in the district who lost their home by fire; my favourite poem; what I would do with £10,000; what I wish I had learnt at school; ideas for the social period; what our menfolk think of our women's group; the work I most enjoy doing; ideas for roll-calls.

Music

When the social half-hour needs to provide activity, music can take the form of community singing. If words are not known, all members should be given a copy. If tunes are unfamiliar, a good pianist should teach the new tunes. The conductor need not always be the same person, but if a group has a really good conductor in its midst, it is indeed fortunate, for then she can be relied on to help all members to enjoy their community singing thoroughly. Songs with musical tunes should be chosen, and new songs should not be avoided.

Some groups will be sufficiently interested in music to form a choir, which can often be called on to provide entertainment for the rest of the group.

If a good gramophone and records are available, a more passive social period may be provided. This should be done only if members have already been active during the earlier part of the meeting. A short talk about each of the records before it is played is valuable.

Musical games and competitions are yet another form of activity.

Dancing

If a group has folk dance records and a gramophone, or someone who can play folk dance music, and someone to act as a coach, folk dances are excellent recreation and entertainment. There may be some more modern dances which some members are anxious to learn and which can be taught to them by others—for example, valeta, destiny waltz, military two-step, and maxina. Particularly with groups mostly or entirely of young people, dancing competitions may be held, those not dancing acting as judges. Exhibition dances may be given by those with talent in this direction or by members' children.

Acting, Reading, and Story Telling

This includes charades, mimes, action songs, reading one-act plays with or without costumes or properties, verse speaking solo or in chorus, reading aloud, and impromptu acting of such scenes as "a crowd watching a fire or fireworks," or "a husband getting off to work in the morning." Some of these should not be impromptu unless people with experience are doing them.

It is necessary to be sure about royalties before producing a play or even reading it in parts.

Games and Competitions

Games and competitions may vary from the vigorously-active running-about type to quite peaceful ones where members can sit still. In every case one member should be made responsible for bringing the necessary equipment to the meeting and should be able to explain the game clearly to all players. Sometimes a trial run through the game is a good idea.

Some active games are relay races and other vigorous team games, musical chairs or musical parcels, and "fox and geese." Less active games include many competitions—for example, moving about the room to work out parts of a competition pinned round the walls, guessing games with clues pinned to members' backs, "shadows" or "giant's steps," "family coach," standing beanbag, and ball games. The quite peaceful games, which members sit to enjoy, are endless—table relays such as passing a penny down the row using the flat of the hand only, pencil and paper games and competitions, "I spy with my little eye something beginning with . . . ," ball passing down a line of seated players using the feet only, paper folding, cutting, or tearing, story-writing games, capping poetry, musical guessing games, and Kim's game.

Other forms of competition are peeling potatoes, bandaging, mending, arranging flowers: guessing the identity of childhood photographs of members; guessing smells; sketching other members or animals; illustrating poems or music (the music must be carefully chosen); left-hand writing; guessing the identity of members by their hands and feet.

Exhibitions

Many simple yet interesting exhibitions can be arranged if all members contribute. The subject must be announced in advance, and at least one member should be appointed to arrange and if necessary label the exhibits and ensure that all are returned to their owners at the close of the meeting. Competitive exhibitions may also be arranged, in which anything from craft work to cut flowers may be displayed and judged.

Though it is good to submit work for criticism, the tendency always to compete against others is a poor motive for doing or displaying work, and exhibitions which are not competitive need to be encouraged. The better type of competition is that in which all exhibits reaching certain standards are awarded one, two, three, or four points. All those who have troubled to exhibit at all may receive one point, but only very high-class work four points, though several or none may receive four points on one day. Only at the end of the season do the members who have received the highest totals receive prizes. Individual competitions at each meeting, with a first, second, and third prize winner, should be discouraged.

Here are some ideas for exhibitions:—

Loan exhibitions—a queer thing, alive or dead; the newest thing in my house; the oldest thing in my house; my greatest household treasure; books our parents read as children; old china; old lace or embroidery; clothes our grandparents wore. It would be good with some of these if the exhibitor gave a little information about the exhibit, particularly if it is somewhat of a treasure.

ALL MY OWN WORK

Work done by members—from the garden, vegetable and flower; from the kitchen; photography; needlework, hand or machine; craft or other handiwork; work done by members after particular demonstrations or classes; original designs for embroidery or other handwork; something new out of something old.

Work done by members' families.

Rhymes, limericks, slogans, or posters on special or general topics—not impromptu, at first at least.

Some of these exhibitions could be made competitive, to be judged by non-competing members or by an outside judge. A guest speaker should not automatically be asked to judge a competition. If she is specially qualified to judge, she should be asked to do so beforehand, or she may be invited to bring a judge with her if she knows of some one suitable. Judging by popular vote is frequently satisfactory.

Inter-group Activities

Where similar groups meet in neighbouring districts, members from another group may be invited to give an entertainment, join in a debate, or enter into a competition with the home group, and such inter-club activities can rightly be included in the social part of the meeting, for wider social contacts are thus brought about.

Several of the suggestions made as being suitable for the social part might sometimes be suitable for the main or special part of the meeting too. Many of the ideas are educational or cultural, or even a good training for future office bearers, who must learn not to be afraid of hearing their own voices in public. Sometimes, as at an annual meeting, the business part will become the special part as well, or sometimes, if a very special speaker is to be heard, the business part will be cut to a minimum. The order of the three parts varies, though business usually comes first and social last.

Much more could be written about all three parts of the programme, about programme planning and about group activities arising out of the montly meeting, but, whatever its particular form, group life can be valuable to each member as well as to the wider community, and especially can it be valuable to those who live in the country.

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"The Social Half-hour," published by the National Federation of Women's Institutes in Great Britain, 1935.

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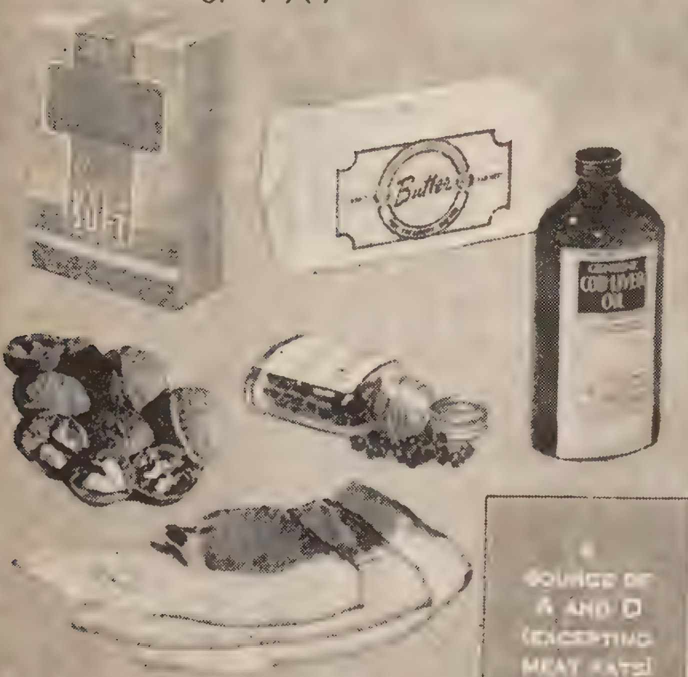
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CARBOHYDRATES. SOME
MINERALS. PROTEIN

WHOLE MEAL
The Energy Breakfast Food
OATMEAL

A SOURCE OF A AND D (EXCEPTING MEAT FATS)

A SOURCE OF B_1 OR THIAMINE

VITAMINS

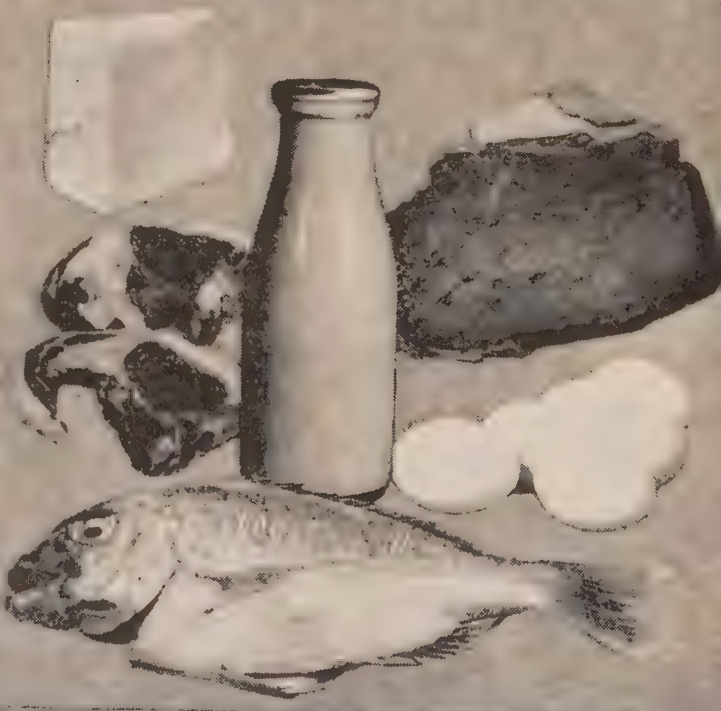
A SOURCE OF C OR ASCORBIC ACID

A SOURCE OF B_2 GROUP

THESE FOODS
SUPPLY VITAMINS.
SOME MINERALS.
CARBOHYDRATES

ROSE HIP SYRUP

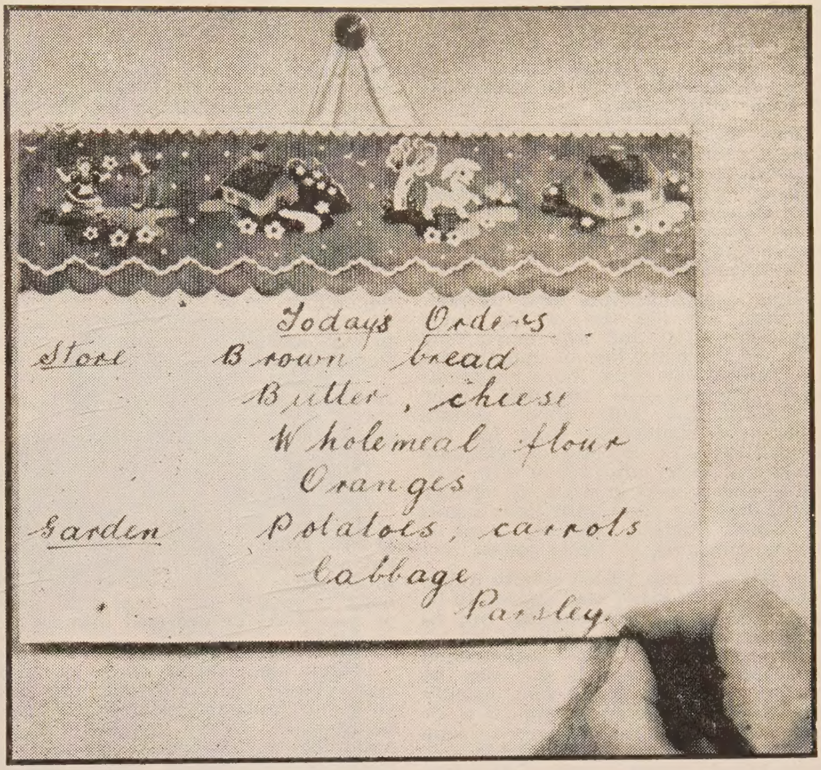
THESE FOODS
SUPPLY PROTEIN.
FAT. MINERAL
SALTS



A Balanced Diet

FOOD PLANNING FOR HEALTH

By EVELYN E. MOORE,
Rural Sociologist, Auckland.



Todays Orders
Store Brown bread
Butter, cheese
Wholemeal flour
Oranges
Garden Potatoes, carrots
Cabbage
Parsley.

THE great progress made by the science of nutrition during the last 30 years has had far-reaching effects on the food and health policies of many countries, and it is now recognised that achievement of good food habits is an important part of any plan for improving national health. Yet the average person, especially in countries such as New Zealand where severe cases of vitamin or mineral deficiencies are seldom seen, often does not realise the serious consequences to his health of poor food habits, and there is a tendency to regard the discovery and development of drugs with remarkable curative properties such as penicillin and crowded living conditions as the two most important factors regulating the health of the community.

THOSE who suppose that as soon as slums are cleared away the breeding grounds for many disease germs will go also, and that with the protection against isolated illnesses afforded by reliable drugs ill health will cease to be a factor to be considered in the country's economy, overlook the fact that good food is still essential if a community is to be fit.

That improvement in housing conditions is not alone sufficient was convincingly demonstrated in England some time ago when it was found that because people in a certain community which had been removed from old and congested areas in the city to fine new council estates in less-crowded areas had to pay for transport to and from work, and as a result had less money to spend on food, they became less fit in their garden suburbs.

Though authorities are now satisfied that there is sufficient reliable evidence, obtained from experiments by nutrition workers and supported by the experiences of health authorities in many countries, to show what foods are most valuable for health and what are best eaten sparingly, perhaps as appetisers or at the end of a meal, the average person is more difficult to convince. When seeking information on this subject he has usually to choose between articles and text books by reputable nutrition workers, which are intended chiefly for the use of other nutritionists and are often so full of technical terms and detailed information that he becomes lost in their complexities, and popular articles and advertisements, which are often written by special diet advocates who disagree among themselves and would have people live on absurdly monotonous and restricted diets or which press the particular advantages of food manufacturers' products. All these conflicting statements can arouse only scepticism in the minds of those who have no means of evaluating correctly the information available.

The extra time and thought required for the preparation of an adequate diet is also a consideration with many, who would count time saved by having a tea-and-biscuit lunch instead of, perhaps, a salad with a glass of milk and sandwiches to be well worth while and are apt not to realise that ultimately such a habit may have serious effects on their health.

In this and following articles principles underlying the formation of diets for good health, as well as some of the more common deficiencies in the average person's diet and suggestions for their prevention, will be discussed.

Diet and Menu Planning

It is unfortunate that a planned diet is commonly misunderstood to mean a rather fixed set of rules for eating or the somewhat irksome and unpleasant lot of invalids and those overweight.

Another factor which may have caused diets prepared for maintaining optimum health to be regarded with disfavour has been the tendency of some dietitians to restrict the diet unduly by including too high a proportion of the protective foods. In this way they are certain of reaching and often exceeding the recommendations which the committee of the National Research Council of America has made about the consumption of the various nutrients essential for health. The committee's standards, however, are only an interim goal for good nutrition which can easily be reached by any good selection of natural foods, and menus based on such diets may become monotonous and impracticable and so lose much of their value, especially if the quantities and proportions of foods suggested do not conform approximately with the habits of the group concerned.

If the housewife is to use the present knowledge of nutrition to the best advantage for the health of her family, she must have some conception of the reasons for the good health recommendations, the main classes into which foods are divided from the nutritive point of view, and of those foods which, because they have little intrinsic value, should be eaten sparingly. She can then readily adapt the type of menu to which her family is accustomed to conform with the recommendations, and modify if she desires popular nutrition slogans without fear of producing deficient diet.

This elementary knowledge of the basic constituents of foods and the amounts needed daily is no more difficult to acquire than that of the basic cooking recipes used every day, or, for the mechanically minded, similar information about the running costs of the family car; yet there is often a temptation to leave its acquisition to

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Photographs on this and opposite pages by Sparrow Industrial Pictures Ltd.

some future date, because of lack of time or a feeling that the diet is adequate in any case. What appears to be quite a varied and well-chosen menu, however, may be deficient in some mineral or vitamin unless it has been constructed with a knowledge of food requirements.

This "hidden" hunger or lack of some essential nutrient is one of the greatest dietary problems in modern civilised nations with an otherwise high standard of living, and is often more common among overweight people who would usually be regarded as well nourished.

Some causes of this type of malnutrition are the use of too much highly-flavoured and sweetened food with a consequent loss of appetite for the blander and often more nutritious food; poorly-chosen reducing diets; prejudices and fads about certain foods; and insufficient time for the preparation and cooking of adequate meals and their substitution with tea-and-biscuit snacks instead of equally simple but far more nutritious meals of bread, butter, cheese, fruit or lettuce, and milk or white coffee.

To plan a menu which is both nutritious and interesting may appear to be unnecessarily time consuming, but an elaborate and detailed plan is by no means necessary. The experienced housewife, even though she may be scarcely conscious of the fact, usually arranges her dinner menus two or three days in advance, if only to cope with the meat rationing or the use of home-killed meat and left-overs. Suitable breakfasts and luncheons to accompany the main meal of the day need not be planned beforehand, especially if the housewife has available a good supply of groceries, home-grown vegetables, and preserved fruit. It is then a relatively simple matter to arrange a lunch which contains a good source of some mineral which may be lacking in the other two meals, to serve the beans which seem to have ripened in unexpectedly large numbers overnight as scalloped beans for lunch, and in other ways to utilise to the utmost the plentiful supply of good food available for the majority of New Zealanders.

Use of Food by the Body

Just as a stove needs fuel for cooking and heating, so the first requisite of the human body is sufficient food to provide heat and energy for normal living activities. Heat and energy are supplied by all foods in varying quantities, and to measure the amount they provide, units of heat and energy called calories are used, just as it is possible to measure in units the amount of electricity used in heating an electric stove or radiator. To continue the analogy, a stove will function well with quite a wide assortment of fuels if various adjustments are made, for coal, wood, gas, electricity, and kerosene used properly are all efficient means of cooking and heating. Similarly, the substances in foods which provide calories—fats, carbohydrates, and proteins—are all used efficiently by the body if care is also taken to provide it with the means of utilisation, that is, the vitamins and minerals present in foods. In fact the choice of food should receive just as much thought as the choice of heating and cooking equipment, in which utility, cost, appearance, and efficiency all receive due consideration by the prospective purchaser.

Food Constituents

Carbohydrates (starches and sugars) and fats are the chief source of calories in the diet. Most natural foods contain a mixture of these substances, their calorie or energy value depending largely on the percentage of water also present (water does not provide calories), and on the proportion of fat to carbohydrate, as fat provides just over twice as many calories from the same weight of dried substance. Excess amounts of both are stored in the body mainly as fat.

Proteins (gelatine and casein are examples of pure proteins) are the main solid constituents of the muscles and tissues and are necessary for their growth and repair. The amounts eaten in excess of the requirement for these purposes are well used by the body to supply more heat and energy or may even be changed into fat and stored.

Protein-rich foods such as meat, eggs, cheese, fish, and milk also have value as appetite stimulants beside being good sources of many of the minerals and vitamins essential for health, factors which compensate for their higher cost.

Accessory food factors: The important and much-discussed minerals and vitamins as well as the extractives belong to this group. Extractives, which give to food its characteristic flavour and colour, may not be essential for life, but they play an important part in the digestion of foods by stimulating the flow of the digestive juices. They also have an important effect on menu arrangement and food selection.

Just how important this effect can be is obvious when it is realised how much of the pleasure of eating would be lost if all meats had the same flavour, if the only reasons for eating vegetables and fruits were their vitamin content, and if the use of flavourings and spices in even the simplest way were impossible.

Vitamins and minerals are the chemical tools required for the conversion of fats and carbohydrates into heat and energy; they are necessary for the normal growth of the body, for keeping the tissues healthy and in good repair, and for promoting the feeling of well-being and cheerfulness associated with good health.

In fact, many foods of low calorie value included in the diet are among the most important constituents because of their high vitamin and mineral content. Some of them, however, especially those richest in minerals and vitamins, tend to receive undue prominence, for though they are all valuable foods to include in any diet, no single one can be regarded as essential.

Foods such as liver, oranges, and black currants are often difficult or expensive to buy, and the nutritional qualities of others—potatoes and carrots, for example — are often stressed mainly as an additional persuasion toward their consumption in greater quantities when the market is oversupplied.

Knowledge of which vitamin and mineral foods may be conveniently substituted for one another may simplify menu planning considerably, especially as it has never been shown conclusively that excessive consumption of minerals and vitamins is beneficial to health. With the important exception of the fish-liver oils containing vitamin D and vitamin D concentrates, there is no need in any well-balanced menu for vitamin or mineral pill concentrates and proprietary health foods.

Vitamin D is unique among the nutrients required by the body, as it is normally produced by the action of the sun's rays on a substance just under the skin and is transported in the blood to where it is required. Most adults, who need only small amounts of vitamin D, obtain practically their whole requirement from sunlight, for only minute amounts are present in the food generally eaten. Babies and children, however, who require greater amounts for normal teeth and bone development, may not obtain sufficient in this way, especially during winter, so an additional supply is advisable, and as the fish-liver oils and vitamin D concentrates are the most convenient source of supply, they are advocated.

The well-planned menu, therefore, contains adequate calories supplied by foods which also provide all the nutrients required for the optimum health of the body. A very simple menu can provide all these nutrients, but without some basic knowledge of their distribution in food a diet deficient in some of them may easily be chosen.

Contrary to general opinion, the appetite is quite useless as a guide to the type of food needed by the body, though it is probably the most useful indication of the quantity required. For example, in Eastern countries where beri beri is one of the most common deficiency diseases the people still demand white rice, though its substitution for brown rice has been one of the chief causes of the disease. Even in New Zealand, where very few people develop deficiency diseases, many lack the feeling of well-being associated with good health because they have poor eating habits. The correction of these dietary faults—which include the consumption of too many cakes and sweets and the neglect of milk and vegetables—without, however, producing a family preoccupied with food fads and calories should be the housewife's aim. This she may most readily achieve by assigning a prominent place on the menu plan to fruits, vegetables, milk and cheese dishes, eggs, meat, bread and other plain and simple foods, and relegating to a minor position cakes, sweets, and highly-flavoured, concentrated foods.

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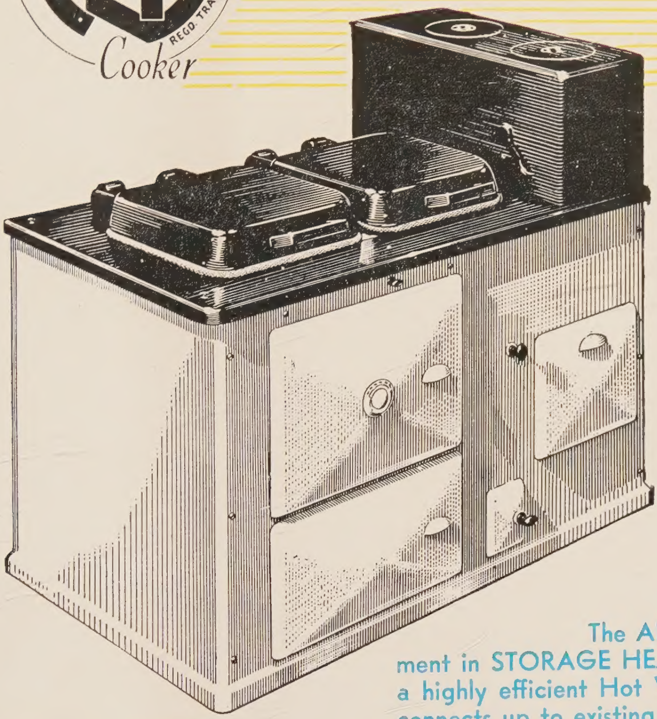

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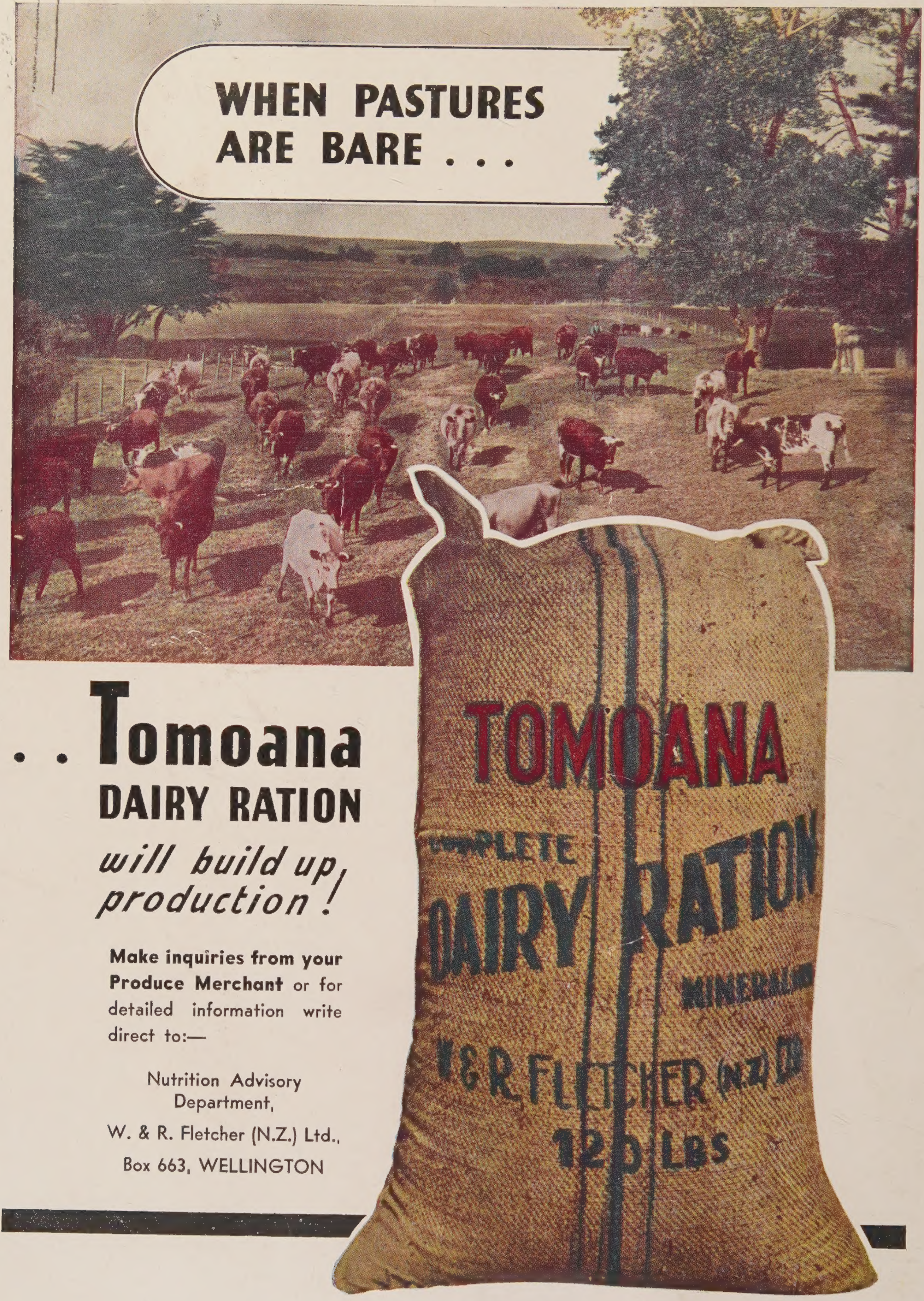
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